A SERIES OF PAPERS ON

ELEMENTARY LESSONS IN AGRICULTURAL ZOOLOGY,

By Prof. J. REYNOLDS GREEN, M.A., D.Sc., Examiner in Botany to the University of Cambridge, will be begun in our next issue.

No. 7.—Vol. 15.
January, 1893.

The Practical Teacher

P. P. 1181. f.

Price Sixpence.

CONTENTS.

	PAGE
Arithmetic Prize Papers. By W. P. Workman, M.A., B.Sc.	347
Well-known Teachers at Work. XXXVII.—Mr. H. J. Spencer. With Portrait ...	348
Modern Educational Reformers. By Thomas Cartwright, B.A., B.Sc. (Lond.).—XV. Rev. Canon Daniel, LL.D. With Portrait	353
Elementary Lessons in Horticulture. By Professor J. R. Green, Sc.D., and F. L. Green	357
Special Examination of Teachers in French	360
New Problems in Arithmetic. By T. B. Ellery, F.R.G.S.	361
Our Pupil Teachers' Course. By George Collar, B.A., B.Sc.	363
Notes and Notions. By Richard Waddington	366
Prologue for School Concert or Entertainment	368
'A Quiet Nap.' By Joseph Despicht ...	369
Conversational Lessons in Chemistry. By Thomas Cartwright, B.A., B.Sc. (Lond.)	371
New Composition Stories.—Standard V. ...	372
New Reading Tests.—Standard III. ...	373
New Dictation Tests.—Standard IV. ...	374
London Matriculation. By R. C. B. Kerin, B.A. (Lond.), and F. J. Schwartz, B.A. (Camb.)	376
Chemistry Notes. By W. Tate, A.R.C.S., F.C.S.	379
Honours Physiography Notes. By R. A. Gregory, F.R.A.S., and A. M. Davies, B.Sc. (Lond.), F.G.S.	380
Mathematics. By G. A. Baxandall... ...	382
Solutions to Questions in Theoretical Mechanics. By F. Castle, M.I.M.E. ...	386
Teachers' Drawing Lessons. By E. Buffery Ridge	387
Coming Men. XIV.—Mr. Shadrach Hicks. With Portrait	389
Legal and Code Queries Column	391
Model Answers to Scholarship Questions ...	393
Reviews	396
Prize Books	397

London: JOSEPH HUGHES & CO., Froebel House, St. Andrew's Hill, Doctors' Commons, E.C.

ALL RIGHTS RESERVED

ADOPTED BY THE SCHOOL BOARD FOR LONDON.

☞ Specially designed for Young Students, Pupil Teachers, and Queen's Scholarship Candidates.

Crown 8vo., 200 pp. Third Edition. Price 2s.

PROFESSOR DARQUÉ'S

PUPIL TEACHERS' FRENCH COURSE,

By F. E. DARQUÉ,

For Sixteen Years Principal French Master, Dulwich College.

A Head Master of a large P.T. Centre writes:—'I have introduced Professor Darqué's French Course, and find the progress of the Class much more rapid and satisfactory than is usually the case.'

Mons. A. DUPUIS, B.A., Senior French Master at King's College School, London, writes to Professor Darqué as follows:

'I have to thank you for the copy you have sent me of your new French Course, and, at the same time, to congratulate you upon its real merits.

'For your work is, indeed, an original work, the result of a long and patient experience, and based upon a rational plan. All senior teachers of the French language will agree with you, that a pupil should, instead of concentrating the whole of his or her mental faculties on the study of grammar, rather become familiar with, and take care to remember, expressions of every-day occurrence in our language.

'To have given a series of interesting lessons, each of which illustrates the use of some important form of the language, and to have appended to them a few simple and lucid grammatical notes, was a difficult task, and you deserve great praise for the way you have accomplished it.'

The Literary World says:—'At last we have the pleasure of welcoming a French Course constructed on rational principles; a course, *i.e.*, which attempts to teach not mere grammar, but the every-day language of educated French people. Prof. Darqué, after thirty-five years' experience as French master, justly ridicules the absurd methods of teaching foreign languages commonly in vogue in England. The Exercise System, as generally used, the study of the poetry and prose of past centuries, and the concentrating at the outset of the whole of the mental faculties on the study of Grammar, are all condemned as inadequate means to the end in view—namely, that one may readily convey one's thoughts to French-speaking people, and understand theirs. Professor Darqué begins by teaching his pupils a few commonplace sentences, and then exercises their understanding by means of question and answer. In his course the first dose of French administered to the student consists of the interrogative pronouns most commonly employed, and a number of short sentences illustrating their use. We notice also that in the early exercises a good number of French words are used that are identical with, or very like, the corresponding English words, thereby giving the pupil useful and encouraging ideas of the kinship of the languages.'

The Modern Language Monthly says:—'We thoroughly agree with the author of this course that, for pupils who begin the study of French after they have learnt a little of the vernacular, the translation of disconnected sentences is not the quickest method of learning the language, and we also concur with him in his strong condemnation of the practice of learning modern French through the medium of the French classics of the 17th and 18th centuries. Accordingly, he proceeds on the plan of first giving an extract of modern French; then a translation of the extract into English, and an exercise for translation built on the vocabulary and phrases of the preceding; and finally, the grammar-rules which they illustrate. On the whole, he has achieved his task successfully. The book is very well printed, and a dexterous use is made of bold type to assist the eye.'

The Schoolmaster says:—'The work seems to be very well executed on the plan adopted; the type is particularly bold and clear.'

The Publishers' Circular says:—'Those beginning the study of French will find this work useful.'

The PROFESSOR OF LITERATURE at the Lycée, Versailles, writes:—'Le plan général de l'ouvrage me paraît excellent; enseigner par la pratique plutôt que par la théorie me paraît la voie la plus rapide et la meilleure.'

The Educational News says:—'The above designed "French Course" deserves commendation as an earnest attempt to familiarise English students with a sensible method of learning French.'

The Evening News and Post says:—'A book that should have a wide popularity amongst those who desire to find a short and easy cut to a knowledge of the French language.'

The Teachers' Aid says:—'Of the making of "French Courses" there is now no end, and this is one of the best among many. . . . . A well got up book in all respects. The printing deserves a special word of praise.'

The Civil Service Gazette says:—'We commend it heartily.'

A HEAD MASTER writes:—'The book certainly is a departure in the right direction, and I intend using it in school.'

SEND 1/6 FOR SPECIMEN COPY TO

JOSEPH HUGHES & Co., Froebel House, St. Andrew's Hill, Doctors' Commons, London, E.C.

☞ ADOPTED AT P.T. CENTRE SCHOOLS.

Fac-simile of Ruling adopted by the Education Department.

HUGHES'S PUPIL TEACHERS' COPY-BOOK.

48 pages. ONE SHILLING.

☞ *Specially prepared for the use of Pupil Teachers, and contains all Copies set for many years in Hand-Writing at P.T. Examinations.*

FORTY Marks are given for the exercise in Copy-Setting at P.T. Examinations, the attainment of which often places a P.T. in a position to secure the highest grant awarded instead of the medium one.

Every page a *fac-simile* of the **Ruling** adopted by the Education Department.

Every copy a *fac-simile* in **length** of those set by the Government.

Alternate pages of large and small hand.

A complete set of small letters arranged in order of difficulty.

Complete sets of large and small-hand Capitals in order of formation.

An invaluable book of reference in Hand-Writing, specially designed as an exercise upon Hughes's Art of Hand-Writing for Pupil Teachers.

ON SAME PLAN. NOW READY. 48 pp. Price 1/-

Hughes's Scholarship Copy-Book.

The SCHOOLMASTER says:—

'Candidates for the Scholarship Examination will find this an excellent aid to penmanship. The letters are clear, bold, free from unnecessary curves, and designed specially for the class of students who will sit in July next. Any Pupil Teacher carefully working through the book will get such a practical acquaintance with good writing that it will be of material importance to him on many an occasion outside Government Examinations.'

ALSO NOW READY on same plan. 48 pp. Price 1/-

HUGHES'S CERTIFICATE COPY-BOOK.

London: JOSEPH HUGHES & CO., Froebel House, St. Andrew's Hill, Doctors' Commons, E.C.

The
Practical Teacher
A MONTHLY EDUCATIONAL JOURNAL.
Edited by JOSEPH HUGHES.

'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

VOL. XV. NO. 7. JANUARY, 1895. PRICE, 6D. POST FREE, 8D.

ARITHMETIC. PRIZE PAPERS.

BY W. P. WORKMAN, M.A., B.SC.,
Head Master of Kingswood School; late Fellow of Trinity College, Cambridge.

A FEW words of preface are perhaps necessary to explain the origin and scope of the examination papers of which this series is composed. For many years past a silver medal has been awarded annually at Kingswood School 'to the best Arithmetician.' The endowment for this purpose was left to the school at a time when Arithmetic was almost the only mathematical equipment of an educated gentleman. I have little doubt that the donor meant 'the best Mathematician,' but unfortunately, he did not say so; and, if we are not to award to the mere vulgar tot-totaller a prize to which decades of traditions attach, there remains, short of an application to the Charity Commissioners, no method by which the founder's wishes can be carried into effect save by setting a paper which shall be about as hard as it is possible to make Arithmetic, shall evoke reasoning power more than mechanism, and shall test knowledge of principles rather than knowledge of rules. A few comparatively simple questions [*e.g.*, 7 of the present paper] are inserted in order that the shorn lambs of lower Forms may feel some kindly airs among the blasts, but the main body of questions are intended for the Mathematical Arithmetician. About half the questions are original, and in other cases their sources are stated, as far as known.

The papers, full solutions of which will be published in successive numbers of this journal, will serve to draw attention to several points in the theory of Arithmetic which have been rather slighted in English Text Books, particularly in regard to circulating decimals, which afford one of the most attractive fields possible for him whom I have called the Mathematical Arithmetician. The restrictions at the head of the first paper sufficiently indicate my own conception of the border-line to be drawn between Arithmetic and Algebra. Algebra I hold to be the science of continuously varying numbers, Arithmetic of discontinuous numbers. Equations and symbols for unknown quantities logically involve the idea of continuous variation and are therefore inadmissible. The progressions are arithmetical; Scales of Notation of course are; so also much of the Theory of Numbers and most of the Theory of Interest and Annuities. But scanty use, however, will be made of rules outside the ken of the ordinary Arithmetician.

It may be of interest to schoolmasters if I add that the prize-winner generally gets about $\frac{1}{2}$ to $\frac{1}{3}$ of maximum marks, and that the time allowed for the paper is three hours.

PAPER I. (K.S., 1893).

[*N.B.*—(1) *Symbols may be used for known quantities, but no working will be accepted in which a symbol stands for an unknown quantity.*
(2) *In questions involving other than the decimal system of notation the working must be throughout in the system adopted.*]

1. The number 30,507,813,000 is the product of five consecutive numbers. What are they?

2. A train leaves A for B every morning at 8 and takes $7\frac{1}{2}$ days for the journey; a train leaves B for A every day at noon, and takes $7\frac{3}{4}$ days for the journey. The speed of these trains on the level is the same, but a part of the journey immediately after leaving B is a steady incline, the effect of which is that the train from B can only travel uniformly at nine-tenths of its rate on the level, while the train to B runs uniformly down one-tenth faster than it did on the level. If I leave A for B on Monday morning, at what time do I meet trains from B?

3. Convert $\frac{1}{509}$ in a recurring decimal.

If $\frac{p}{n}$ and $\frac{n-p}{n}$ be converted into circulating decimals, find the relation between the figures in their periods, n being supposed prime to 10 and $p < n$. (Camb. Tripos, 1877.)

4. It being given that 27,722 is the product of two consecutive integers, prove that $\frac{1}{277\frac{1}{22}}$ is a mixed circulator with one non-recurrent figure in which the recurrence commences with the 6,808th figure.

5. Prove by the Theory of Circulating Decimals that $10^{191} + 1$ is divisible by 383, and therefore by 4,213.

6. Calculate in scale 11 the value to 30 places of undecimals the value of:—

$$\frac{tt,tt,tt3}{tt,tt,tt4} - \frac{tt,tt,tt1}{tt,tt,tt2}$$
$$\overline{\frac{tt,tt,tt7}{tt,tt,tt8} - \frac{tt,tt,tt5}{tt,tt,tt6}}$$

7. A bag contains sixpences, shillings, and half-crowns; the three sums of money expressed by the different coins are the same; if there are 102 coins in the bag, find its value? (Camb. Tripos, 1867.)

8. A man has £1,583 17s. 11d. in 3 per cent. stock, and £982 12s. 6d. in 3½ per cent.; he transfers a certain sum from the former to the latter when the stocks are at 91 and 98 respectively, and thus makes the income derived from each the same. How much has he finally in the 3 per cents.? (Camb. Tripos, 1881.)

9. Working throughout in scale 20 in which $t = 10$, $e = 11$, $n = 12$, $m = 13$, &c.

(1) Convert $\frac{1}{\kappa}$ and $\frac{1}{17}$ into recurring vicesimals.

(2) Convert 12345678*ten* into scale 10.

(3) Add ·12*m*, ·56*κ*, ·8*o*, and ·*t*.

(4) Subtract ·123 from ·789.

(5) Find the cube-root of 1*κn*1*te*1*m*8*o*.

(6) Find the fourth-root of 4*te*0*n*98*o*.

10. Two clocks, one of which gains 15 seconds (of its own time) per day of true time, while the other loses 15 seconds per day, are set together with the hour, minute, and second-hand of each all pointing to XII at midday on October 27th, 1893. Prove that their hands can all point to the same figure only at XII o'clock, and find the day of the week and the date on which this will next occur. (The second-hand is a 'centre-second' in both cases.)

11. If the hands of a clock were exactly alike in size and shape, it would still be almost always possible to tell which was which and thus to read the time by carefully noting their relative positions; but at about 10½ minutes past one (for example) there is an instant when the time shewn is really ambiguous (and might be about 5 minutes past two); find it exactly, and say what other time is simultaneously indicated. When would this state of things occur next?

12. A certain reef of quartz when crushed yields ·0011 per cent. of gold. If the working expenses amount to 62·5 per cent. of the gross receipts, and the nett profit on each 100 tons crushed amounts to £52 10s., find the number of grains in a sovereign. (St. John's College, Camb., 1884.)

13. On July 1st at 8 a.m. by my watch it was 8 hours 4 minutes by my clock. I took the watch to Greenwich and when it said 'noon' the true time was 12 hours 5 minutes. That evening when the watch said 6 hours, the clock said 5 hours 59 minutes. On July 30th at 9 a.m. by my watch, it was 8 hours 57 minutes by my clock. At Greenwich when the watch said 12 hours 10 minutes, the true time was 12 hours 5 minutes. That evening when the watch said 7 hours the clock said 6 hours 58 minutes. My watch is only wound up for each journey and goes uniformly during any one day; the clock is always going and goes uniformly. How am I to know when it is true noon on July 31st? (Due to Lewis Carroll, of 'Alice in Wonderland.')

WELL-KNOWN TEACHERS AT WORK.

XXXVII.—MR. H. J. SPENCER,

Bloomfield Road Board School, Plumstead, S.E.

NATURALLY and normally critics are not to seek with respect to the sayings and doings of such an important body as the London School Board; and the march of events within the last few months has not been calculated either to disarm or to decrease the number of this fraternity. Wherefore with respect to every phase of its work, London's educational parliament has been subjected to much weighing in the balance. This is especially the case respecting the provision made for the small, but exceedingly important, minority of gifted children who, at the early age of 11 or 12 years, with two or three years of school life still before them, pass the VI. or VII. Standards.

From Chief Inspector Sharpe downwards, complaint has been made concerning the neglect of these quick-witted children who, in many cases, are condemned to mark time with wearisome monotony, until employment brings relief to the dreariness of successive years spent in the same standard at the same work.

To meet the difficulty, what are known as higher standard schools have been established here and there throughout the Metropolis and its suburbs to the number of 49; but, be it noted, in only twelve of these schools do Ex. VII. Standard children receive their education in class-rooms and under teachers distinct from the rest of the school. Of these schools, in his latest report, Mr. Sharpe speaks in the following terms:—

The establishment of higher grade or higher standard schools has been welcomed by a class of parents who have either been out of easy reach of a good secondary school, or unable to pay the usual term's fee of a secondary school, with the addition of fees for books, stationery, etc.

There are forty-nine of these higher standard schools distributed over the metropolitan area; but *only in three cases is there much to distinguish them from the ordinary schools*, except that some of the scholars are presented for South Kensington examinations as well as for those of the Education Department.

The three schools forming the exception are Medburn Street (St. Pancras) (Boys), Bloomfield Road (Plumstead) (Boys), and Thomas Street (Limehouse) (Boys and Girls).

In each case the upper division of the boys' school is worked as an organized science school, and there are two divisions of Thomas Street girls' school, in one of which the girls are specially prepared for the Civil Service examinations, and in the other for examinations conducted by the College of Preceptors.

MEDBURN STREET.—There are two divisions of the school, juniors and seniors, numbering together about 100 boys.

The science subjects taken are:—Mathematics, theoretical and practical chemistry, physiography, plane and solid geometry; in each case both the elementary and advanced stages are taught.

The following art subjects are taught:—Freehand and model drawing—in each case elementary and advanced—and elementary clay modelling.

Besides the above subjects, shorthand, woodwork, singing, and English are also taught.

Boys showing an aptitude for any particular kind of work taught in the school receive special attention in that subject.

The school possesses an excellent chemical laboratory and a very good art room.

BLOOMFIELD ROAD.—Average attendance for the year, 99.

The subjects taught are the elementary and advanced stages of mathematics, sound, theoretical and practical chemistry, mechanics, magnetism, plane and solid geometry, and freehand and model drawing.

The school is near to Woolwich Arsenal and Dockyard, and at the last examination for apprentices (a difficult one for boys, especially in mathematics), of the 21 boys who were successful, 17 were from this school. The school also did well at the South Kensington examinations last May.

THOMAS STREET (*Boys*).—About 90 in average. The great drawback here is the want of a chemical laboratory.

The master aims at preparing boys for posts to be obtained chiefly in iron and chemical works in the immediate neighbourhood.

The subjects taught are theoretical chemistry, second grade drawing, mathematics, plane and solid geometry, machine construction, magnetism and electricity, shorthand, English literature, and ironwork.

THOMAS STREET (*Girls*).—This is a very interesting school, and is doing most valuable work. Girls who have received their early training here are now to be found as teachers in high schools and training colleges, and in good positions in the postal and telegraph offices.

Many valuable scholarships have been won, among them one for the Royal Holloway College, Egham.

There are 67 girls working in the Civil Service class, and at recent examinations high places have been secured on the lists. Three times the first girl in the country, in geography, has come from this school.

BRITISH MUSEUM

One of the truest and best tests of the excellence of a school is the attitude of its ex-scholars towards education. Sceptics are not wanting who claim that the net effect of the new education is to create a strong and lasting disgust for books and the acquisition of knowledge. Be this as it may, Mr. Spencer's evidence does not point in that direction. 'We have the gratification,' were his words, 'of seeing many of our lads continue their work after leaving school. For example, the list of Whitworth scholars just issued contains the name of an old Bloomfield Road boy—Mr. W. Swinger.'

'Our school,' said Mr. Spencer, deprecatingly, 'is in no way a show school, and I fear there is little to see.' Of this we had our own opinion, with which the reader is by this perfectly familiar. We went on to ask about the organization, and learnt that the school is arranged thus:—

Standard II.—72 boys under a Certificated Master.
Standard III.—61 boys under a Certificated Master.
Standard IV.—72 boys under a Certificated Master.
Standard V.—70 boys under a Certificated Master.
Standard VI.—74 boys under a Certificated Master.

Upon passing Standard VI. the boys are at once drafted into the Organised Science School, which is divided into two sections, viz.:—

(1) 1st year.—60 boys taught by a Certificated Master.
(2) 2nd year.—50 boys taught by a Certificated Master. An Ex-P.T. renders general assistance in the Organised Science School.

The time table of the Science School is given at the end of this article. We further learnt that History, Geography, and English, are the class subjects, the specifics being Mechanics and Algebra. Furthermore, Chemistry and Mensuration are begun in Standard IV., to prepare for the work of the Organised Science School, Euclid being added in Standard VI.

The boys of the Science School take the subjects laid down by the Science Directory, to wit:—

1st Year—Mathematics, Stage I., Practical Plane and Solid Geometry; Elementary Inorganic Chemistry, Theoretical and Practical; Elementary Physics; Free-hand and Model Drawing of the Second Grade.

2nd Year—Elementary Mechanics; Magnetism; Second Stage Mathematics; Geometry; and Advanced Chemistry, both Theoretical and Practical.

In addition to this departmental work, English, French, History, and the usual school subjects are taken, in order to counterbalance the scientific training with the necessary development on the literature side.

The growth of the school was evident from the figures supplied to us by Mr. Spencer.

Science teaching, it appears, was commenced six years ago, the first grant received on this account amounting to £14. This year the respectable total of £550 will be reached, so that even the most Philistine ratepayer need not grudge promising London children their higher grade schools.

'Yes, of course, we are English enough to have our grievances, and real ones too,' was our host's reply to a question we hazarded, 'but upon these I need not dwell as they are dealt with in the recent report of the London Board Inspectors on higher standard schools.' Said Mr. Spencer: 'These remarks summarize excellently the difficulties with which we have had to contend. It is a matter for regret that only two or three teachers under the London School Board are at present eligible for admission to the Association of Head Masters of Higher Grade and Organised Science Schools, but I look forward with hope and confidence to a time in the near future when we shall have a number of schools which will be in every sense "Higher Grade Schools." That they could be made a success both educationally and financially I have not the slightest doubt.'

MR. HAROLD J. SPENCER.

By Edwin T. Faulkner, Woolwich.

In case our readers may not have seen the report in question, we reproduce the remarks referred to:—

Upper Standard Schools.—Upper standard schools have been established about three years. They are not, as their names would lead one to suppose, schools devoted entirely to the teaching of upper standards. They are certain selected schools where a better provision is supposed to be made than in an ordinary school for children who are in Standard 7, or who have passed that standard and are willing to continue their studies a little longer.

It was found that under ordinary circumstances comparatively few children remained in school after they had passed the 6th Standard. Those who did remain could not be taught separately, for the proportion in each department (except one here and there specially favoured) was too small to warrant a separate teacher; they were, therefore, generally grouped and taught with another standard. Under such circumstances they could not be well taught, and very little encouragement was given them to stay in the schools, where they practically became a hindrance to the work of the other scholars. To remedy this fault it was thought it would be better to take the few 7th Standard children from each school in a group and let them be taught as a whole in one school, which was then to be designated as an 'upper standard school.' Additional staff and additional facilities were to be given in order that a more extended

curriculum might be taken up. It was thought that under such a system parents would be encouraged to keep their children longer at school, and to some extent this has proved to be the case.

The system has encountered many difficulties which have greatly militated against its success. Firstly, a great proportion of the Head Teachers whose schools were not selected as upper standard schools were hostile to the movement. They do not like to send their children to any other school for fear the idea should prevail among their scholars that a neighbouring school is superior to their own. This hostility has been active in some cases and passive in others. There are many so-called 'feeding schools' that have never contributed a single pupil to the upper standard schools.

Secondly, there is a want of accommodation in the upper standard schools themselves. As a rule the selected schools were, previous to their selection, popular schools and already full. Many of them are so full with their own pupils, and so congested in the lower standards, that to prevent overcrowding we have been compelled in some instances to direct the teachers to refuse admission to the few children applying from the 'feeding schools.' The original plan seems to have contemplated that the upper standard schools should be relieved from the pressure of the lower standards by the building of junior mixed departments. As, however, little has been done in that direction, the difficulty still continues. Under present conditions it is extremely difficult for some of the teachers to give separate rooms for the upper standards.

Thirdly, there has been, and this more especially applies to the girls' schools, the want of technical qualifications for higher work in the teachers themselves. This difficulty is, however, being loyally overcome, and will soon cease to exist.

Another point has been the want of uniformity in the preparation of children who came from the 'feeding schools.' The Head Teachers of the upper standard schools complain rather bitterly about this, and although there may be some exaggeration in this direction, there is still some truth in it, and it continues a serious defect, which hinders a successful working of the system.

We have extreme difficulty in making the teachers believe that upper standard schools are likely to be permanent institutions. This feeling is shared by many of the teachers in the upper standard schools themselves, and is caused by the idea prevalent with some that they have not been liberally treated on the question of staff. We try to assure them that the system will develop.

With regard to the selection of the upper standard schools we feel that revision is necessary. There are schools outside the list that are better than some which have been selected. There are some schools so situated that they might be declared upper standard schools without having any 'feeding schools' attached to them. The pupils in such schools would stay on if additional facilities were given them, and we think that these should be afforded.

At present the additional work done in the upper standard schools is mainly in the direction of advanced drawing and science. Owing to a change in the marking of papers by the Science and Art Department the results seem poor, but we think with a little patience, with increased experience in teaching in this direction, and with the additional facilities that will come when the laboratories and art rooms are built, that the work will be highly successful. Other subjects have been introduced into the schools, but it is yet too early to measure their amount of success.

While we feel that there is a great potentiality for good in the upper standard schools, we are of opinion they will never be the success they ought to be unless they are relieved by the lower standards. The upper standards to be really successfully taught must have separate rooms and separate teachers.

The fact that steady work is the order of the day at Bloomfield Road need hardly be recorded, for nothing but persistent perseverance could account for such a roll as the following, which gives the result of last year's teaching :—

BLOOMFIELD ROAD BOARD SCHOOL, PLUMSTEAD.

The following recent successes amongst the boys of this school are recorded :—

LONDON COUNTY COUNCIL SCHOLARSHIPS.

Senior (value £110, together with free education for four years at a technical school).—Walter C. Butter, Charles R. Dow. *Junior* (value £20).—W. J. Simpson, J. Rodd, A. Bark, G. Oakely, L. Holiday, J. Kirk. F. Coe, H. Broughton.

SCIENCE AND ART DEPARTMENT.

CHEMISTRY, Advanced Theoretical.—2nd Classes, 10. Elementary Theoretical.—Passes, 40; Fair Passes, 7.

MATHEMATICS, Stage II.—1st Classes, 8; 2nd Classes, 10. Stage I.—Passes, 29; Fair Passes, 7.

CHEMISTRY, Advanced Practical.—1st Classes, 9; 2nd Classes, 4. Elementary Practical.—Passes, 14; Fair Passes, 8.

P. P. AND S. GEOMETRY, Advanced.—2nd Classes, 2. Elementary.—Passes, 32; Fair Passes, 10.

MECHANICS, Elementary.—Passes, 10; Fair Passes, 5.

MAGNETISM AND ELECTRICITY, Elementary.—Passes, 6; Fair Passes, 4.

SOUND, LIGHT AND HEAT, Elementary.—Passes, 11; Fair Passes, 7.

DRAWING, Freehand.—1st Classes, 6; 2nd Classes, 21. Model.—1st Classes, 5; 2nd Classes, 13.

Surmising that particulars concerning one of London's three Higher Grade Schools could not but be acceptable to the curious readers of the 'PRACTICAL TEACHER,' we found ourselves, notebook in hand, at Bloomfield Road 'to see what could be seen.'

Mr. Spencer, in whom we rejoiced to find an old friend, received us with that courtesy and cordiality which those who know him would expect at his hands.

A walk round the school, a building of the usual London School Board Type, soon made it evident to us that higher grade work is carried on here with an enthusiasm calculated to defy failure and ensure success. As to this the Head Master, in response to our questioning, said, 'Whatever meed of success has fallen to the lot of this school I attribute to the following causes :—In the first place we have an excellent infant school which gives us the necessary start. Secondly, I have an exceptionally well qualified staff of masters thoroughly and conspicuously devoted to their work. To these must be added a good class of boys, located in an excellent building

and provided with good appliances.' 'And,' was our mental addendum, 'happy in the possession of a Head Master who is nothing if not enterprising and enthusiastic to a degree, and a wide-awake educationist to boot.' We were curious as to the Royal Arsenal competitions. 'A large number of our boys,' said Mr. Spencer, by way of satisfying our thirst for knowledge in this direction, 'take positions there. On this account we give as much prominence as possible to mathematics, as the entrance examination in this particular, as you will see from the specimen paper, is stiff.' We agreed to this, and we think that our readers will endorse our agreement upon perusal of the said paper, which we give herewith for their enlightenment.

Arithmetic.

1. Value of

$$\sqrt{(194 + 65) \times 7 + (352 - 220) \div 11} - 952 \div (91 - 35).$$

2. A gallon contains 277·274 c. in. A cubic foot of water weighs 62½ lbs. How many gallons will weigh a ton? And what is the weight of a pint?

3. To the continued product of $6\frac{1}{2}$, $7\frac{3}{8}$, $8\frac{3}{4}$, add $\frac{3\frac{5}{8}}{4\frac{4}{5}}$, and divide sum by $9\frac{1}{6}$ of $10\frac{5}{8}$ of $12\frac{3}{5}$.

4. Simplify $\frac{1\frac{7}{9} \text{ of } 3\frac{4}{12}}{1\frac{1}{12} \text{ of } 9\frac{3}{11}} \div \frac{4\frac{4}{7} \text{ of } \frac{21}{160}}{2\frac{5}{8} \text{ of } \frac{1}{32}}$.

5. Multiply 1 cwt. 2 qrs. 3 lbs. by 5·125, and reduce 2 lbs. 3 oz. to decimal of a ton.

6. Reduce $\left(\frac{2\cdot375}{3\cdot16} \text{ of } \frac{4\cdot4}{\cdot0625}\right) \div \left(\frac{8\cdot8}{7} \text{ of } \frac{4}{5\cdot625}\right)$

7. After deducting a charge of $8\frac{3}{4}\%$ on a certain sum, and then a charge of $6\frac{1}{4}\%$ on the remainder, the result is £310 5s.: required the sum.

8. $\sqrt{\cdot009059}$; $\sqrt{464\frac{4}{81}}$; $\sqrt[3]{\cdot578703}$.

9. Fast train leaves A for B, 120 miles, at 2 o'clock, travels 25 miles per hour. At what time must luggage train travelling 15 miles in 50 min. have left so as not to be overtaken by fast one?

10. Suppose 15 men do 966 c. yds. in 8 days of $10\frac{1}{2}$ hrs.—how many men did a contractor engage for 12 days of $7\frac{1}{2}$ hrs. to excavate 575 c. yds. if found it necessary to engage 4 additional workmen during the last 4 days to do the work in 12 days?

Algebra.

1. $a = 1$, $b = 2$, $c = -\frac{1}{2}$, $d = 0$.

$$\frac{a - b + c}{a - b - c} - \frac{ad - bc}{bd + ac} - \sqrt{\frac{b^3}{a^3} - \frac{a^3}{c^3}}.$$

2. Find product and quotient of

$$(x - y)^3 - 2y(x - y)^2 + y^2(x - y) \text{ and } x - 2y.$$

3. Simplify

$$\frac{x}{x^3 + x^2y + xy^2 + y^3} + \frac{y}{x^3 - x^2y + x^2y - y^3} + \frac{1}{x^2 - y} - \frac{1}{x + y}.$$

4. G.C.M. and L.C.M. of $24(x^3 + xy^2 + xy^2 + y^3)$ and $16(x^3 - x^2y + xy^2 - y^3)$.

5. (*a*) $\frac{2x + 3}{x + 1} = \frac{4x + 5}{4x + 4} + \frac{3x + 3}{3x + 1}$.

(*b*) $(x - a)(x - b) = (x - a - b)^2$.

6. $\frac{x}{a} + \frac{y}{b} = 2 \quad bx - ay - 0$.

7. $\frac{x + 2}{x + 1} + \frac{x + 1}{x + 2} = \frac{13}{6}$.

8. Clock has two hands on same centre; one goes round once in twelve hours, other in 16 hours. In what time will the faster gain 1 round on slower?

9. Man and boy paid for certain days' work. Man 27s., the boy, absent for 3 days, 12s. Had man instead of boy been absent those 3 days, they would both have claimed an equal sum. Find the wages of each per day.

10. A person spent a certain sum in goods which he sold again for £24, and gained as much per cent. as the goods cost him. Find cost of the goods.

1. Find diameter of O whose circumference = perim. of triangle (right-angled), base 32", ht. 24".

2. Sides of 105', 116', 143'.

Find length of perpendicular from angle on to longest side.

3. Cylindrical vessel 14·8" in diameter and a sphere are each found to weigh 62½ lbs. more when filled with water than when empty. Find other dimension of the vessel.

4. Reservoir 100' diameter top, 80' diameter at bottom, 15' deep, supplied a village of 150 inhabitants with water. Average consumption 5 c. ft. per person. How many days' supply will reservoir hold?

5. Base of pyramid, height 30", is a trapezoid, par. sides 8" and 10" apart. The pyramid cut in two by plane parallel to base, and 18" above the base. Find volume of new pyramid.

6. Hemispherical dome 50' diameter is covered in sheet lead weighing 2 lbs. per square foot. Find weight of lead used.

7. Water trough 10 ft. by 18" by 10" full of water. How many times conical vessel 10" diameter and 15" deep filled from it?

8. Boy's hoop made of iron bar ½" diameter is 39" high. How much does it weigh, lbs.? C. in. of iron = ·28 lbs.

9. State method of finding—
Area of rhombus;
Area of segment of circle;
Volume of frustum of pyramid.

One possession of the school must not be passed over without mention, and that is the Metallurgy Cupboard, wherein are found specimens of ores in the various stages of extraction. This collection, which is unusually complete, is of immense benefit to children who may find themselves, ere long, in the Arsenal; and it speaks well for Mr. Spencer's *savoir faire* and energy that he should have persevered in getting together such a unique assemblage of useful specimens, most of which he has collected during his holidays, the ruling passion being strong even in vacation times.

One pleasant feature of the interview was the anxious desire uniformly exhibited by Mr. Spencer to shrink into the background, and give credit to all who had had part or lot in the education of his boys. Of the Infants' Mistress, of his assistants, and of his predecessor, Mr. Hartley, who, seven years ago, died whilst at the head of the school, he speaks in terms of highest praise. As to his assistants, all of whom are, as is necessary, exceptionally well qualified, he considers that they are receiving scant justice from the London Board, inasmuch as they receive no consideration whatever in return for the extra knowledge, skill, and training which the nature of this work imperatively demands. This is all the more inexplicable, from the fact that assistants in Pupil Teachers' Schools, having a curriculum no more advanced than that of an Organised Science School, receive preferential treatment in a double sense. In the first place their scale of salary is at a higher rate than that of the ordinary assistant, whilst they have a better standing with respect to promotion. Mr. Spencer

contends, and common sense will certainly second him, that something of a kindred nature should be done for the Science School assistant. We cannot doubt but that his demand will, ere long, be conceded.

As to the Science and Art Department, Mr. Spencer is full of hope. Recent declarations have persuaded him that real sympathy and appreciation will at length be apparent in the attitude maintained by the Department towards the teaching of science in its elementary phases. This belief is another example of Mr. Spencer's habit of thinking evil of no man. We can only say that we hope—but whilst hoping we also fear—that his faith may be justified by the works of the South Kensington Department. Meanwhile, we are expectant.

We have left little space for personal notes, anent which we imagine Mr. Spencer looking over our shoulder and ejaculating, 'For this relief, much thanks.' This of course must be taken as an expression of self-deprecation for which we have already prepared our readers.

Born in Lancashire, Mr. Spencer became a Pupil Teacher under his namesake, Mr. Richard Spencer, Island Road School, Barrow-in-Furness, with whom however he could claim no kin. Of his old master he has the most grateful recollection.

In due time he passed to Westminster Training College, becoming, upon leaving, the Head Master of the Milnrow Mixed School, which he left for the Headmastership of the Darwen Factory School.

Later on he was attracted to London, and entered the service of the Board as Assistant Master in the Vicarage Road School, Plumstead.

He obtained his promotion ten years ago, when he was appointed Head Master of Powis Street School, Woolwich. Here he remained for three years, when he succeeded Mr. Hartley as Head Master of Bloomfield Road. How this school has expanded under his wise management we have been privileged, in some measure, to show. That it may be his congenial and happy lot to lead it to further developments is the earnest wish of his question-loving interviewer, yet, withal, appreciative friend.

It must not be supposed, however, from this summary that hard work only is the order of the day at Bloomfield Road. The social and physical welfare of the boys is by no means neglected.

In reply to questions, Mr. Spencer said: 'During the summer months we ran a swimming club with gratifying success. Our school also is fairly strong in the football field, and we have teams occupying creditable positions in both the senior and junior divisions of the Woolwich Schools Football Association. In addition we are during the present winter endeavouring to develop the social element in the school by providing minstrel and lantern entertainments, which up to the present have proved highly successful. Our own nigger troupe provides the first part of the programme, while the members of the Woolwich Photographic Society have kindly helped us by lending their slides for the lantern.'

TIME TABLE.

ORGANISED SCIENCE SCHOOL (BOYS), BLOOMFIELD ROAD, 1894-95.

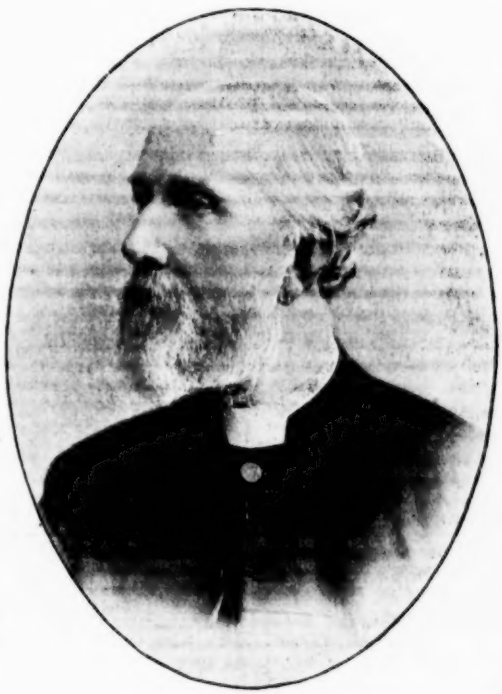
Day.	MORNING.				AFTERNOON.			
	9.40—10.40.	10.40—10.50.	10.50—11.30.	11.30—12.	2.0—3.0.	3.0—3.40.	3.50—4.20.	4.20—5.0.
Monday	1. Algeb. (St. I.)		Elementary Chemistry (Demonstration)		Geometry (P. & S.)		Practical Chemistry (Elementary)	
	2. Algeb. (St. II.)		Magnetism	Mechanics	Geometry (P. & S.)	History	English	Mathematics
Tuesday	1. Arith. (St. I.)		Physics	Euclid	Drawing	French	P. S.	Mathematics
	2. Trig. (St. II.)		Advanced Chemistry (Demonstration)		Drawing		Advanced Practical Chemistry	
Wednesday	1. Algeb. (St. I.)	Interval.	Elemen. Chmstry.	Drill	Geometry (P. & S.)		Practical Chemistry (Elementary)	
	2. Algeb. (St. II.)		Advncd. Chmstry.	Mechanics	Geometry (P. & S.)	French	History	Mathematics
Thursday	1. Arith. (St. I.)		Elemen. Chmstry.	Euclid (Stand. I.)	Drawing	English	French	Mensuration
	2. Trig. (St. II.)		Drill	Magnetism	Drawing		Advanced Practical Chemistry	
Friday	Arith. (St. I.)		Elemen. Chmstry.	Euclid	Physics	Singing		French
	2. Arith. (St. II.)		Advncd. Chmstry.	Mechanics	Magnetism	Singing		French

MODERN EDUCATIONAL REFORMERS.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
Author of 'Mental Science and Logic for Teachers.' Late Director of the Birkbeck Training Classes and Lecturer therein on School Method.

No. XV.—THE REV. CANON DANIEL, LL.D.

When this series of sketches was projected, two years ago, it goes without saying that such a striking figure in the educational world, as Canon Daniel undoubtedly is, was not permitted to escape the Argus eye of the projector, especially when it is added that, any time during the past two or three decades, it would have been a matter of little difficulty to effectually prove that Battersea's Principal had already won his spurs as an Educational Reformer.



It is now matter of common knowledge that the Archbishop of Canterbury has marked his sense of Canon Daniel's worth by entrusting to his care the cure of the 10,000 odd souls constituting the growing township of Horsham. To-day, then, when the Principal is soon to be Principal no longer, when the sturdy worker is on the eve of retiring from at least the more arduous and exacting of his labours, is a fitting occasion for gazetting him in our Reformer's Chronicle.

Impelled by the sweet reasonableness of this conclusion, and encouraged by the courtesy with which our *pourparlers* were received, we wended our way to that corner of Battersea which is adorned by St. John's College.

Although the evening was somewhat advanced, and despite the fact that the Canon is compelled to carefully husband his time since he is now performing, perforce, the double function of Principal of Battersea and Vicar of Horsham (his predecessor in the latter office not being able to remain at Horsham any longer), an hour was found for us which we spent in a pleasant chat with the Canon in his study. Before referring to the conversation thereupon ensuing, let us pass in review the various events in the interesting career of the vicar-designate.

Gallant little Wales, that has played so prominent a part in the recent Inspectorial appointments, will be proud to know that Canon Daniel hails from the land of the leek, having been born at Pontypool in the first year of the present reign. As pupil-teacher at the National School of his native town Canon Daniel commenced his career, his Head Master being Mr. William Dovey. It was not long before the pupil-teacher began to prove his mettle, for in the Church Scholarship List, recording the result of the 1855 examination, the name of Evan Daniel will be found occupying an honourable position. Passing to Battersea College, the student held his own so yeomanly as to obtain the coveted distinction of a third year's course, which, being concluded, still found the young Welshman at Battersea, now in the capacity of Government Lecturer. How well this part of his work was done is evident from a consideration of the fact that, in 1863, Canon Daniel was made Vice-Principal to the Rev. Robert Graves; moreover his ability, mounting to occasion, won for him in 1866 the position which, after nearly forty years' service, he is about to vacate. During this forty years it is simple justice to say that Canon Daniel has uniformly been *facile princeps* among Principals. His career at Dublin University was a succession of triumphs, bringing out into bold relief a fact, already proved at Battersea, namely, the mastery of Canon Daniel over the English language and its literature, and the great attraction this study had for him. In 1868 and in 1870 he won the Vice-Chancellor's prize for English verse, and, in 1869, the prize for English prose fell to his lot; in 1870, when he took his B.A., was Gold Medallist in History, Political Science and English Literature, and Senior Moderator. In 1874 he was gazetted Master of Arts.

At the present time Canon Daniel is delivering a course of lectures on Practical Education at the College of Preceptors, with which Institution the Canon is closely and worthily connected. The traditions of the place that has known Jos. Payne, Robert Hebert Quick, Dr. Fitch, and Professor Sully amongst its lecturers are such as the Principal of Battersea would appreciate to the full. Of these traditions Canon Daniel has shown himself to be abundantly worthy. Since the establishment of the Diploma of Education by the London University, Canon Daniel has been the examiner in practical skill for this educational degree. Furthermore, the position of Lecturer to the Teachers' Training Syndicate of Cambridge, which gave birth to Dr. Fitch's admirable lectures on Teaching, was, in 1861, filled by the subject of our present sketch. The Teachers' Guild has claimed him as congenial

contends, and common sense will certainly second him, that something of a kindred nature should be done for the Science School assistant. We cannot doubt but that his demand will, ere long, be conceded.

As to the Science and Art Department, Mr. Spencer is full of hope. Recent declarations have persuaded him that real sympathy and appreciation will at length be apparent in the attitude maintained by the Department towards the teaching of science in its elementary phases. This belief is another example of Mr. Spencer's habit of thinking evil of no man. We can only say that we hope—but whilst hoping we also fear—that his faith may be justified by the works of the South Kensington Department. Meanwhile, we are expectant.

We have left little space for personal notes, anent which we imagine Mr. Spencer looking over our shoulder and ejaculating, 'For this relief, much thanks.' This of course must be taken as an expression of self-deprecation for which we have already prepared our readers.

Born in Lancashire, Mr. Spencer became a Pupil Teacher under his namesake, Mr. Richard Spencer, Island Road School, Barrow-in-Furness, with whom however he could claim no kin. Of his old master he has the most grateful recollection.

In due time he passed to Westminster Training College, becoming, upon leaving, the Head Master of the Milnrow Mixed School, which he left for the Headmastership of the Darwen Factory School.

Later on he was attracted to London, and entered the service of the Board as Assistant Master in the Vicarage Road School, Plumstead.

He obtained his promotion ten years ago, when he was appointed Head Master of Powis Street School, Woolwich. Here he remained for three years, when he succeeded Mr. Hartley as Head Master of Bloomfield Road. How this school has expanded under his wise management we have been privileged, in some measure, to show. That it may be his congenial and happy lot to lead it to further developments is the earnest wish of his question-loving interviewer, yet, withal, appreciative friend.

It must not be supposed, however, from this summary that hard work only is the order of the day at Bloomfield Road. The social and physical welfare of the boys is by no means neglected.

In reply to questions, Mr. Spencer said: 'During the summer months we ran a swimming club with gratifying success. Our school also is fairly strong in the football field, and we have teams occupying creditable positions in both the senior and junior divisions of the Woolwich Schools Football Association. In addition we are during the present winter endeavouring to develop the social element in the school by providing minstrel and lantern entertainments, which up to the present have proved highly successful. Our own nigger troupe provides the first part of the programme, while the members of the Woolwich Photographic Society have kindly helped us by lending their slides for the lantern.'

TIME TABLE.

ORGANISED SCIENCE SCHOOL (BOYS), BLOOMFIELD ROAD, 1894-95.

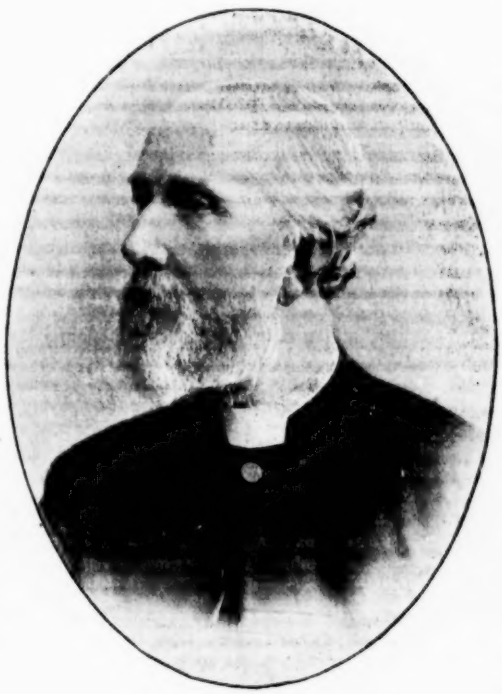
Day.	Morning.				Afternoon.			
	9.40—10.40.	10.40—10.50.	10.50—11.30.	11.30—12.	2.0—3.0.	3.0—3.40.	3.50—4.20.	4.20—5.0.
Monday	1. Algeb. (St. I.) / 2. Algeb. (St. II.)	Interval.	Elementary Chemistry (Demonstration) / Magnetism	Mechanics	Geometry (P. & S.) / Geometry (P. & S.)	Practical Chemistry (Elementary) / History	English	Mathematics
Tuesday	1. Arith. (St. I.) / 2. Trig. (St. II.)		Physics / Advanced Chemistry (Demonstration)	Euclid	Drawing / Drawing	French / Advanced Practical Chemistry	P. S.	Mathematics
Wednesday	1. Algeb. (St. I.) / 2. Algeb. (St. II.)		Elemen. Chmstry. / Advncd. Chmstry.	Drill / Mechanics	Geometry (P. & S.) / Geometry (P. & S.)	Practical Chemistry (Elementary) / French	History	Mathematics
Thursday	1. Arith. (St. I.) / 2. Trig. (St. II.)		Elemen. Chmstry. / Drill	Euclid (Stand. I.) / Magnetism	Drawing / Drawing	English / Advanced Practical Chemistry	French	Mensuration
Friday	Arith. (St. I.) / 2. Arith. (St. II.)		Elemen. Chmstry. / Advncd. Chmstry.	Euclid / Mechanics	Physics / Magnetism	Singing / Singing	French / French	

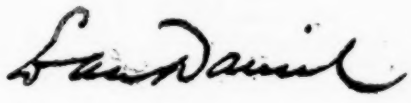
MODERN EDUCATIONAL REFORMERS.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
Author of 'Mental Science and Logic for Teachers.' Late Director of the Birkbeck Training Classes and Lecturer therein on School Method.

No. XV.—THE REV. CANON DANIEL, LL.D.

When this series of sketches was projected, two years ago, it goes without saying that such a striking figure in the educational world, as Canon Daniel undoubtedly is, was not permitted to escape the Argus eye of the projector, especially when it is added that, any time during the past two or three decades, it would have been a matter of little difficulty to effectually prove that Battersea's Principal had already won his spurs as an Educational Reformer.





It is now matter of common knowledge that the Archbishop of Canterbury has marked his sense of Canon Daniel's worth by entrusting to his care the cure of the 10,000 odd souls constituting the growing township of Horsham. To-day, then, when the Principal is soon to be Principal no longer, when the sturdy worker is on the eve of retiring from at least the more arduous and exacting of his labours, is a fitting occasion for gazetting him in our Reformer's Chronicle.

Impelled by the sweet reasonableness of this conclusion, and encouraged by the courtesy with which our *pourparlers* were received, we wended our way to that corner of Battersea which is adorned by St. John's College.

Although the evening was somewhat advanced, and despite the fact that the Canon is compelled to carefully husband his time since he is now performing, perforce, the double function of Principal of Battersea and Vicar of Horsham (his predecessor in the latter office not being able to remain at Horsham any longer), an hour was found for us which we spent in a pleasant chat with the Canon in his study. Before referring to the conversation thereupon ensuing, let us pass in review the various events in the interesting career of the vicar-designate.

Gallant little Wales, that has played so prominent a part in the recent Inspectorial appointments, will be proud to know that Canon Daniel hails from the land of the leek, having been born at Pontypool in the first year of the present reign. As pupil-teacher at the National School of his native town Canon Daniel commenced his career, his Head Master being Mr. William Dovey. It was not long before the pupil-teacher began to prove his mettle, for in the Church Scholarship List, recording the result of the 1855 examination, the name of Evan Daniel will be found occupying an honourable position. Passing to Battersea College, the student held his own so yeomanly as to obtain the coveted distinction of a third year's course, which, being concluded, still found the young Welshman at Battersea, now in the capacity of Government Lecturer. How well this part of his work was done is evident from a consideration of the fact that, in 1863, Canon Daniel was made Vice-Principal to the Rev. Robert Graves; moreover his ability, mounting to occasion, won for him in 1866 the position which, after nearly forty years' service, he is about to vacate. During this forty years it is simple justice to say that Canon Daniel has uniformly been *facile princeps* among Principals. His career at Dublin University was a succession of triumphs, bringing out into bold relief a fact, already proved at Battersea, namely, the mastery of Canon Daniel over the English language and its literature, and the great attraction this study had for him. In 1868 and in 1870 he won the Vice-Chancellor's prize for English verse, and, in 1869, the prize for English prose fell to his lot; in 1870, when he took his B.A., was Gold Medallist in History, Political Science and English Literature, and Senior Moderator. In 1874 he was gazetted Master of Arts.

At the present time Canon Daniel is delivering a course of lectures on Practical Education at the College of Preceptors, with which Institution the Canon is closely and worthily connected. The traditions of the place that has known Jos. Payne, Robert Hebert Quick, Dr. Fitch, and Professor Sully amongst its lecturers are such as the Principal of Battersea would appreciate to the full. Of these traditions Canon Daniel has shown himself to be abundantly worthy. Since the establishment of the Diploma of Education by the London University, Canon Daniel has been the examiner in practical skill for this educational degree. Furthermore, the position of Lecturer to the Teachers' Training Syndicate of Cambridge, which gave birth to Dr. Fitch's admirable lectures on Teaching, was, in 1861, filled by the subject of our present sketch. The Teachers' Guild has claimed him as congenial

spirit and President. Royal Commissions have invoked his aid as witness, and Convocation of the Rochester Diocese owes much to Canon Daniel for the light he has thrown upon educational problems at their periodical discussions. Of course Canon Daniel has been a member of the London School Board. This was in the period from 1873 to 1879, about which time the then Rev. Evan Daniel was made an honorary canon by the Bishop of Rochester.

In one and all of his multifarious offices Canon Daniel has uniformly and consistently sought how to bring about the greatest educational good of the greatest number. His grand aim has been to popularise mental science as the ground-work of true educational method. This will be apparent from the extracts at the foot of this article. As to this, we need hardly contend that no reform could be so far-reaching and fruitful of good as that which insists upon a sure foundation of science as absolutely essential to intelligent practice. Of this more anon; meantime we apply ourselves to the task of transcribing the rough notes of what passed on the occasion of our visit to St. John's.

Our first question referred to the curriculum. 'Do you, Canon Daniel, think that we are in possession to-day of a syllabus of instruction the working of which is calculated to more truly educate our scholars than that previously in vogue?' 'We are advancing,' answered the Canon, 'in a right direction, but there is a risk that too much may be attempted. This, however, is a matter in which each individual teacher can, by exercising his judgment, apply the needed remedy. The tendency of latter-day Code-makers is in the right direction, aiming as it does at the abolition of mere mechanical cram and at the furtherance of the cultivation of the intelligence.' We reminded our host of the fact that the teacher with respect to the latest additions to the Code has no option, the subjects such as drawing, object lessons, and varied occupations, being obligatory, and that these, excellent in themselves, are impossible of attainment in consequence of the insistence upon the full tale of bricks as to the number of sums to be correctly worked and as to the spelling. To this the Principal, in response, said, 'the Traditions of the Department are too strong for the most ardent reformer, hence, during a period of reform and readjustment, hardship will inevitably occur, to be, however, removed as its existence becomes painfully apparent. I would, however, emphasise my strong opinion of the excellent intentions of those who have controlled English education in recent years.' This opinion must impress upon teachers the urgent necessity for agitation with respect to the latest additions to the subjects of instruction. We proceeded to broach the subject of inspection, and were pleased to find Canon Daniel at one with the teachers in desiring an examination not so much of the children as of the teacher's methods, which, being good, and the teacher honest, the results may well be left to look after themselves, especially as the remoter results, viz., the ultimate character of the pupil, cannot possibly be gauged. 'For this higher work of method examination, do you not think there should be a methodical selection of Inspectors calculated to create a body of educational experts?' To this question we received a ready affirmative, whereupon we proceeded to ask what Canon Daniel thought of the iniquitous custom of excluding teachers, as such, from the Inspectorate. In reply Canon Daniel said, 'I fully recognise the truth of the contention that a would-be Inspector must have the threefold qualification of scholarship, professional skill, and social *savoir faire*. But,' he added, 'teachers need not shrink from any of these tests. I have known, and know many teachers admirably qualified in every way to fill the post of Inspector, and I shall hail with satisfaction the appointment of an Inspector straight from the school.' We referred to the 35 year age limit, and were not surprised that the Canon at once gave the solution of this apparent difficulty. 'I would have this rule still in force in the case of non-teacher candidates for the post of Inspector. As for the teacher, both justice and expediency agree in demanding an extension of this age limit, if the best qualified teachers are to be available. For the rest I would have absolute free-trade with respect to the Inspectorate, the teacher to be recognised as equally eligible with every other class of competent men.' Adding our fervent wish to the Canon's desire for promotion direct from the ranks, we next touched upon the sister injustice of shutting out well qualified elementary teachers from grammar and secondary schools. To this lament a sympathetic ear was not wanting. Moreover, the Canon was constrained to admit that, despite notable exceptions, the rule

undoubtedly holds that albeit your elementary teacher, by virtue of his training, is welcomed as English master in secondary schools, he meets with little sympathy, and his chance of promotion is infinitesimal. 'This is all the more deplorable,' added the Principal, 'from the fact that whenever an ex-elementary teacher does get to be Head Master of one of these schools, it is not long before his success becomes so pronounced as to incontestably prove his unique fitness for the post. This I have recently stated in my evidence before the Royal Commission on Secondary Education. As to a remedy, the only hope is that those who govern our secondary schools may see the fatuity of shutting out the only trained teachers in our midst.' From this it will readily be gleaned that Canon Daniel does not believe in the man who has veneered himself with culture (with a capital C) at a University (with a capital U), saying to the elementary teacher, 'thus far and no farther,' when the latter has been promoted to the Head Mastership of an Elementary School or the Under-Mastership of a Grammar School. In his own words, 'Every post in the educational world should be opened to the elementary teacher qualified to perform the duties thereof.' A modest and a moderate request in all conscience, for the granting of which, however, the teacher has still to reiterate 'how long?' Canon Daniel is not particularly struck with the claims of technical instruction 'as she is taught.' In the first place, he condemns the folly of having one authority to deal with ordinary instruction and another to control technical instruction. The school authority should be the technical instruction authority. Futhermore, it must, he urged, be never lost sight of, that the essence of instruction, be it technical or otherwise, consists in the formation and development that result from its use as an instrument. Wherefore a trained teacher should be the technical teacher, and his first care should be to see that the higher benefits of developed power and enlarged capacity are not sacrificed to the mere attainment of technical skill.

Notwithstanding the lateness of the hour, we could not refrain from reference to security of tenure, and very glad we were, for a question from us disclosed the fact that Canon Daniel had a half-formed impression that it was the intention of the profession to make the undertaking of extraneous duties impossible. 'I hold,' said he, 'that every man should be free to make the most of his qualifications by undertaking, if qualified therefor, other duties in addition to those inseparable from his office of schoolmaster.' 'Of course,' was our rejoinder, 'we do not object to that. What we do object to is that a master, whose school-work is in every way satisfactory, should have his tenure of office disturbed because it is found desirable to get a cheap organist or other official in the person of the schoolmaster. Volunteer effort we have nothing to do with. We simply hold that a schoolmaster should not be compelled, on pain of dismissal, to perform duties unconnected with his office, for the performance of which he has never contracted.' 'In that contention I participate,' was our host's cordial reply.

Turning now to education in general, Canon Daniel addressed himself to the task of laying bare his predilections. 'Early in my career I found, in dealing with my students, an utter absence of agreement in method, and a complete inability to explain why and wherefore certain methods were preferred before others. This set me thinking and studying with the view to discover whether the science of education could or could not reduce this chaos to something like order, until finally I found myself not content with merely finding fault, but rather concerned in showing the inconsistency of the faulty procedure with some sound law of pedagogics. Being naturally drawn to the study of mental science and logic, I found this habit most congenial, and although many teachers, both elementary and secondary, have shown themselves utterly sceptical as to the good that can come to education from an enlightened study of those minds upon which they have to work, I have long been convinced that so soon as a teacher is able to look upon a child as an organism with budding powers that he has to perfect, so soon as he is able to recognise the progress of the mind-development in each and every child under his care, so soon will teaching be stripped of all its drudgery and become the noblest of all professions.' Being somewhat of this persuasion ourselves, we were delighted to hear such an expression, and forthwith we drifted into a conversation on what had been done in this direction by English authors. This led to the mention of Robert Hebert Quick, whom Canon Daniel knew well; indeed, his last lecture was given at Battersea, and it was refreshing to hear the Principal's enthusiastic testimony to the worth of 'dear old Quick,' as also to the incessant labour that was spent upon the 'Essays on Educational Reformers' by this enthusiast.

A word now on Canon Daniel's work as an author. With his work on the English language every teacher is familiar. For the National Society's work on School Management he wrote 'The Training of the Senses and the Cultivation of the Memory,' 'The Teaching of History,' and 'The Teaching of Grammar.' He is also the editor of an edition of 'Locke's Thoughts,' which came out just at the same time as Quick's work on the same subject, the curious point in this connection being that each author was ignorant of the intention of the other until the books actually appeared, there being, of course, no intentional rivalry.

We had heard some rumours of a work on 'Education' from the pen of Canon Daniel, which should place before his readers the results of the experience and research of the author. Knowing how valuable such a work would certainly be, we expressed a cordial wish that the expectation would not be disappointed. 'It is perfectly true,' was the Canon's reply to this, 'that I have by me the materials for such a work, which I hope to produce, when, it is impossible to say, as the exacting nature of my new appointment will render my leisure for such a task small, if not actually hypothetical, for it is a mistake to suppose that my duties will be light, there being three churches for which I am held responsible.' We also learnt incidentally that Canon Daniel is making a pecuniary sacrifice in accepting the Horsham appointment.

With earnest wishes for the success and comfort of Canon Daniel in his new sphere of usefulness, we at length put a period to one of the most interesting interviews it has been our lot to assist at.

We now proceed to give a few extracts from some of Canon Daniel's papers that were read before the

College of Preceptors, and published in the *Educational Times*:—

'COMMON FAULTS IN TEACHING CONSIDERED IN THE LIGHT OF MENTAL SCIENCE.

'The critic who proposes to speak of Common Faults in Teaching has no lack of matter to complain of, for it is difficult to move a step in education without committing some fault or other. We may, for instance, teach a subject, but not the child; or a child and not the subject; we may teach the right class of subjects in wrong ways or the wrong class of subjects in right ways; we may do too much for our pupils or too little; we may teach the class as a whole and not the individual, or the individual and not the class; we may attempt too much or too little; we may use a method, suitable at one stage of development, in teaching children who are passing through a very different stage; we may cultivate one side of a child's mind at the expense of another; we may, in short, commit mistakes in teaching anywhere and everywhere.

'Now there are various ways in which we may avoid mistakes. We may follow what appear to be the best examples. It has not been left for us to discover the whole of the secrets of education. Education is one of the oldest of the arts, if not of the sciences, and the experience of the world has taught us that certain methods of instruction are more successful than others. We may stand on the shoulders of our predecessors and, while avoiding their blunders, appropriate their discoveries. Hence the enormous importance to the would-be teacher of studying the History of Education, and of serving an apprenticeship in some school where he may at once enter upon the possession of the highest form to which the Art of Education has been brought.

'But there is something more wanted than good models, and that is, an intelligent comprehension of the principles on which successful education, whatever be its methods, depends. Without such a comprehension we are liable to rob the best methods of much of their value, through the mechanical way in which, regardless of varying circumstances, we apply them; and we shall be unable, except by accident, to improve on the practice of our predecessors. I need hardly say that the extent to which intelligence is brought to bear upon education makes a vast difference not only in its results, but in the character of the work itself. The dullest subject and the dullest child become interesting when the higher powers of the mind are set to work to make the subject interesting and the child acute.

'Now what are the principles by which the teacher must be guided? I know of none that do not rest upon the laws of body and mind. We must conquer Nature by obeying her. We cannot teach *what* we like, but only what a child is capable of assimilating. We cannot teach *how* we like, but only as Nature will allow us to teach. In other words, all our methods are conditioned by what a child is, and a knowledge of child nature is indispensable to intelligent education. I do not propose, in the short time at my disposal, to attempt any general survey of the laws of mind, but I will single out a few here and there to illustrate the close connection between theory and practice. This I do the more readily because I have found many teachers sceptical about the practical value of mental science. It is sometimes argued, in depreciation of the study of the science that underlies art, that a ploughman will not drive a straighter furrow for knowing Euclid, nor a cook make a better plum pudding for knowing the chemical constituents of the ingredients. I admit the force of the argument as regards ploughmen and cooks, though I can conceive cases where the ploughman would be all the better for a little geometry, and the cook all the better for a little chemistry; but the work of the teacher is of a very different character from that of either the ploughman or the cook. It deals with much more difficult problems, in the solution of which rule of thumb, skill, and the recipes of some educational Mrs. Beeton go but a little way.'

'I pass on to lessons demanding the employment of the observing faculty, and here the commonest error I find is the neglect of observation. Children are not sufficiently required to use their senses. They are allowed to observe by deputy. They look at Nature through the spectacles of books, and through the eyes of the teacher, but do not observe for themselves. It might be expected that in object lessons and science lessons, which are specially intended to cultivate the observing faculty, this fault would be avoided, but I do not find that such is the case. I often hear lessons on objects that are not object lessons at all. The object is not allowed to speak for itself, eloquent though it is, and capable though it is of adapting its teaching to the youngest child who interrogates it. The teacher buries it under a heap of words and second-hand statements, thereby converting the object lesson into a verbal lesson, and throwing away golden opportunities of forming the scientific habit of mind. Now mental science teaches us that our knowledge of the sensible qualities of the material world can come to us only through our senses, and through the right senses. If we had no senses we should know nothing about the material world at all; if we had a sense less we should be cut off from a whole class of facts; if we had as many senses as are ascribed to the inhabitants of Sirius in Voltaire's novel, our knowledge would be proportionately greater than it is now. Words cannot compensate for sensations. The eloquence of a Cicero would not explain to a deaf man what music is, or to a blind man what scarlet is. Yet I have frequently seen teachers wholly disregard these obvious truths. They have taught as though their pupils had eyes that saw not, and ears that heard not, and noses that smelled not, and palates that tasted not, and skins that felt not, and muscles that would not work. They have insisted on taking the words out of Nature's mouth and speaking for her. They have thought it derogatory to play a subordinate part to the object itself. Like Bottom in the play, they have wished to play all the leading parts, from the lion's to Thisbe's. With what result I need not say. Now in object lessons and science lessons the teacher must be content with the humble duties of a demonstrator. He must let Nature teach for herself, and content himself with arranging the order of her teaching, getting his pupils to ask her the right questions in the right sort of way, securing opportunities for her replies to be fairly heard, recording her answers in intelligible and accurate language, and registering them in convenient forms for remembering. Hitherto he has overshadowed both Nature and his pupil; he must be taught by mental science to know his place. There is a good deal for him to do yet, but he will never do much as a teacher until he has disabused his mind of the error that he is *the* teacher. He is only one of a crowd of teachers, and in Nature's school he must be content with the post of assistant. Yes, head-master though he be, he must come down from his high stool and let Nature take his place.'

'Teachers seem sometimes surprised at their pupils forgetting, whereas the pupils, perhaps, never had anything to remember but the empty symbols of knowledge. They are astonished at the muddle-headedness of their pupils, overlooking the fact that the knowledge, reproduced in a state of muddle, was stowed away in a state of muddle, for which they are themselves responsible. They might as reasonably expect to find an empty purse fill itself with gold, or the contents of an old drawer sort themselves. I would say to them, Do not in the first instance trouble about Memory. See that the other faculties do *their* work, and Memory will not fail to do hers. I do not say that there is no original difference in the retentive power of different memories. Far from it. But I am convinced that most of the complaints we hear of bad memories are groundless. The real defect lies further back. We never properly observed, and we do not possess correct images; we never properly compared, and we do not possess distinct ideas; we never properly noted the relations of ideas, and do not possess correct judgment; we never properly compared our judgments, and have not drawn correct conclusions.'

'*It has been said that the whole art of memory, so far as there is such an art, consists in attending to the three A's, Attention, Arrangement, and Association.*'

'EDUCATIONAL METAPHORS.

'The whole vocabulary of education is made up of metaphors, for the simple reason that education has mainly to do with mind, and mind, as we have seen, can be spoken of in no other way. Some of these metaphors are so faded that we often overlook their original significance. To *teach* meant, primarily, to point out; to *learn*, to find out; to *educate*, to draw out; to *instruct*, to build into; to *attend*, to stretch to; and so forth. Many educational metaphors still retain their rhetorical character, and the number is ever growing. There is scarcely a department of nature, an art, craft, manufacture, mode of life, or amusement that has not contributed to the teacher's vocabulary, and each metaphor, it will be remembered, carries with it a cluster, more or less large, of correlative metaphors.

'Thus the mind is a garden to be weeded, sown, and planted; a tree to be trained, pruned, and rendered fruitful; a house to be duly swept and garnished; an animal organism, more or less vertebrate, with innumerable wants that must be ministered to. It is plastic clay waiting to be fashioned into any shape at the will of the potter; it is stone that has to be hewn into shape, carved and polished. Now it is ore, more or less precious, to be purged of the dross that obscures its brightness; now it is a colt to be broken in and plied with whip and spur; now it is a ship to be furnished with ballast, sails, rudder, chart and compass, and a freight of learning; now it is a sword to be highly tempered and provided with the finest edge, and now a rougher instrument intended for rougher work.

'Sometimes the mind is a dark place needing illumination; sometimes it is itself a source of light; sometimes it is a living spring, and sometimes a stagnant pool. It is a pitcher to be filled, with an unfortunate propensity for running away from the spout once the pump-handle begins to move; a laboratory where all sorts of

transformations are effected; a spark to be fanned, and occasionally a fire to be put out. Like water it cannot, we are told, rise above its own level; like gas, it is marvellously elastic; like matter generally, it is subject to the laws of inertia and gravitation. Now you cannot get it to move, and now it will not stop. It is characterized by the most opposite qualities, sometimes needing to be hardened, and sometimes to be softened; now to be screwed up, and now to be let down a peg; now to be stimulated, and now curbed. "The soul of a child," says Bishop Earle, "is yet a white paper, unscribbled with observations of the world, wherewith, at length, it becomes a blurred note-book." To others it is a palimpsest, with traces of successive records that mount up in their antiquity to our first parents. From a chemical point of view it has curious affinities, and finds its way into all sorts of mechanical mixtures; from an electrical it is subject to extraordinary attractions, repulsions, shocks, currents, and discharges; from a mechanical it is at once an original force and a resultant of forces; it is sometimes a lever and sometimes a fulcrum; too often it descends an inclined plane, and follows the momentum of natural inclination to mischief; it is alternately parsimonious in economising force, and prodigal in its expenditure; it invariably follows the path of least resistance, and furnishes endless illustrations of the law of conservation of energy. Sometimes it is raw material for the manufacturer, and sometimes it is a mill itself, which, in the absence of other things to grind, has been known to grind itself, and, for want of other things to spin, has spun, as examiners know, the most wonderful fabrics out of its inner consciousness. In an age of steam like ours, it was inevitable that the mind should be spoken of as a steam-engine; and in an age of criticism like ours, it is not surprising that we should hear complaints sometimes of the time some of these engines take to get up their steam, and of the high pressure at which they are occasionally driven. It is alleged that in various competitive races the reckless drivers of these engines have been known to sit on the safety valves.

'As a consequence of this Protean character of mind its wants are of the most varied character, and the teacher has to discharge all sorts of functions. Among its needs are armour for protection from all sorts of foes, weapons of offence and defence, tools of all sorts, keys for opening doors, threads for stringing ideas on, pegs for hanging facts on, straps for tying up logical bundles with, a copious assortment of labels, pigeon-holes, scales for weighing the imponderable, crucibles for assaying ores, tests for analysing, and a thousand other things which require that a school should be a sort of general store, and the teacher a sort of didactic Whiteley, or universal provider. He must be a farmer, a gardener, a nurse, a cook, an architect, a builder, a potter, a smith, a doctor, a furnisher, a cutler, an engraver, a groom, a polisher, a painter, a musician, a sculptor, a tamer of wild beasts—in short, the rest of society rolled into one—"everything by turns and nothing long." If there is one man who has more right than another to say that "one man, in his time, plays many parts," it is surely the schoolmaster. This may account, perhaps, for his occasional failures. In addition to the white arts I have mentioned, he must possess the black art of the magician, and be capable of making the dull acute, the bird-witted attentive, the muddle-headed clear, the dunce a genius; he must be able to tame the indomitable, correct the incorrigible, and generally alter the unalterable; he must exert occult influences by which grapes shall be produced from thorns, swans made out of geese, and silk purses out of sows' ears. Occasionally he pretends to be able to do all this, and thereby adds to his other metaphorical trades that of a quack.'

ELEMENTARY LESSONS IN HORTICULTURE.

BY PROFESSOR J. R. GREEN, SC.D.,
Late Examiner in Botany to the University of Cambridge, and
F. L. GREEN,
Late Science Mistress in the Clifton High School.

XI.—Fungus Pests (*continued*).

Onions are a vegetable very liable to the attacks of fungus pests, even when well-grown and favoured by dry weather. A troublesome parasite is *Puccinia mixta*, which first appeared in England on chives during the summer of 1883. It consists of club-shaped bodies, each composed of a brown head and a transparent stalk, which springs from a matted mass of brownish fungus spawn or mycelium. These brownish bodies, it must be noticed, are of two classes, some being perfectly simple, formed of a single cell, while others, the teleutospores, consist of two conjoined cells, or, if a larger cell, have a distinct joint across the centre. Because each sorus or pustule-like mass of brown club-shaped bodies contains two sorts of spores, the fungus is called *mixta*. After resting for eight, nine, or ten months the teleutospores germinate, a thread protruding from each of the two cells which coils round like a shepherd's crook and produces three joints, from each of which a fine branch arises bearing at its top an irregular oval transparent spore of a pale amber colour. These spores germinate very readily. The only effectual method of preventing the spread of this pest is to burn all infested plants, and all the kitchen garden rubbish on which the *Puccinia* has grown. An allied fungus, *Puccinia malvacearum*, attacks hollyhocks.

Another disease attacking onions, *Peronospora schleideniana*, is a close ally of the dreaded potato disease, *Peronospora infestans*. In appearance it is of tree-like growth, its mycelium threads repeatedly branching and rebranching. At the ends of the branchlets are borne pale grey or lilac ovate spores, the *conidia*, which at germination burst at the side. Resting spores are formed as in the case of *Peronospora infestans*, which carry on the life of the fungus during the winter. This pest attacks the leaves and stems (bulbs), sending its fruiting branches through the stomata or organs of transpiration into the air. The inner cells of the leaf and stem putrefy by contact with the mycelium, while the fertile threads choke the stomata, preventing the evaporation of water in the form of vapour. In bad cases the onion plant becomes an offensive putrid mass. Another form of onion mildew, apparent as greyish gelatinous spots which speedily run together, is caused by *Fusisporium atrovirens*, and often attacks onions at the same time as the *Peronospora*. This fungus closely resembles *Fusisporium solani*, which attacks the potato; but the spindle-shaped spores are more curved, and are of a greyish-green or greenish-black colour. Mildews are most destructive pests, attacking peas, roses, lilies, etc., as well as garden vegetables. An extremely dry season, wet and cold weather, and bad cultivation, make their attacks a certainty. In the case of the onion, deep trenching and the autumn sowing of seed are advocated as the best methods of prevention. All mildewed material should be most carefully burned. Dusting with sulphur is the usual remedy in the flower garden.

Onion mould, *Mucor subtilissimus*, is closely allied to the mould *Mucor mucedo*, which grows on jam and damaged fruit. It is extremely minute in size. When it attacks the onion the whole substance of the neck near the bulb, and sometimes the bulb itself, is traversed by fine threads of mycelium in the midst of which are countless black minute grains, the Sclerotia, which differ from the Potato Sclerotia, already described, in their much smaller size and their less compact and more thread-like structure. The process of germination may be readily observed under the microscope. When placed in a drop of water the thread-like mycelium of the Sclerotium protrudes, elongates, and branches in every direction. As soon as the mycelium reaches the edge of the water, minute globose heads, the *sporangia* or spore cases, are formed on the tips of the branches and

become filled with elliptic spores, which on the bursting of the spore case are set free in the air, where they soon germinate, continuing the species, the small mycelial threads which protrude forming little white knots, which on exposure to the air become the minute black granules known as Onion Sclerotia. Since these Sclerotia carry on the life of the fungus in a hibernating state during the winter, infected plants and refuse should be very carefully burned.

The mildew which attacks parsnips, *Peronospora nivea*, like the other species of *Peronospora* already noticed, causes putrescence, setting up decay in the leaves, stems, and roots of the vegetable. The spores or conidia are borne on extremely thin threads, and are dull-coloured and non-lustrous in appearance. When mature there emerge from them several small spores, which become furnished with two extremely fine and thin vibrating hairs or cilia, and by means of which they are capable of propelling themselves and sailing about rapidly over any moist surface. These zoospores are no doubt carried from plant to plant by the wind causing damp diseased leaves to flap against healthy ones. After swimming about for a short time they burst, producing mycelium, which in its turn, when it has entered the host plant by the organs of transpiration, reproduces the *Peronospora*. A fungus often found in conjunction with this pest is *Protomyces macrosporus*, whose resting-spores, or oospores, when small in size are hardly to be distinguished from those of *Peronospora nivea*. The mycelium belonging to the two fungi is different, however, and the oospores of *Protomyces* produce large numbers of extremely minute oscillating spores. These escape, conjugate in pairs, and produce zygospores, which on germination, by means of their germinal threads, penetrate the epidermis of the plant invaded by them. They are minute transparent oscillating bodies not furnished with cilia. As *Peronospora nivea* produces resting-spores within the stems and roots of the plants attacked, all parsnips infested by them should be carefully burned. Parsnips after an attack of mildew should not be grown a second year in the same place, as the resting-spores will be on and in the ground ready for attacking other umbelliferous plants on their germination in the spring.

Pea mould, *Peronospora viciae*, occurs frequently on the under surface of the leaves of peas, causing brownish downy patches and putrescence of the tissues. The spore-bearing branches grow in clusters. The spores are borne on extremely long slender threads, and are of a dull grey colour. On germination they do not burst at the apex, the germ tube being generally protruded from the side. The resting-spores are brown, and become reticulated by the shrinking of the outer coat. Damp close weather greatly extends the field of operation of this fungus, which sometimes attacks the pods of garden peas and their contained seeds. All diseased and decaying pea refuse should be carefully gathered together and burned, for this is the material in which the resting-spores hibernate during the winter.

Pea mildew, *Erysiphe martii*, unlike pea mould, is especially virulent in dry seasons, and is the pest of late varieties. It grows on both surfaces of the leaves, which in bad cases appear to be thickly dusted with white chalk. On the white surface thus formed there can be seen with the naked eye countless black globose bodies called conceptacles, which possess jointed tentacle-like appendages. Each conceptacle contains four or eight sporangia or spore cases, and from four to eight spores are enclosed in each sporangium. The very fine white mycelium from which the conceptacles arise forms a densely woven mass all over the stomata, and consequently arrest the transpiration of vapour by the leaf. In small gardens the attacks of this fungus may be prevented by keeping the crop of peas well watered, but watering unhappily favours the growth of *Peronospora viciae*. *Erysiphe martii* attacks beans as well as peas. All infested material should be most carefully burned, for the conceptacles remain intact in decaying refuse during the winter, and burst, discharging their spores, in the following summer.

The garden lettuce, the most useful of salad plants, suffers from a putrefactive mildew, *Peronospora gangliformis*, which derives its name from its flattened fruiting stems and branches twisting in the process of growth, thus presenting the appearance of ganglionic swellings. Each ultimate branchlet is dilated into a saucer-like expansion, from the centre of which grows a minute, excessively thin spicule, and from the edge of which three to five similar minute spicules are given off. On germination the weakest part of the oval spore or conidium dissolves away, and the contained material pours out as a germinal thread. In whatever part of the leaf or stem the mycelium grows it sets up putrescence, causing pallid patches of decomposition to appear. In the spring this pest is first descried in the outside leaves near the ground, where the air is still and humid, and it gradually extends to the heart of the lettuce. In the autumn it damages the flowers and seeds. Since thickly-sown plants suffer most from the ravages of this fungus, lettuce seed should be sown thinly. Lettuces grown in frames are especially liable to be attacked by mildew. They should be given as much air as possible, and a short exposure to a slight frost has been found to destroy the fungus without permanently damaging the lettuces. Enormous conglomerated masses of the oospores or resting-spores hibernate in rotting lettuce refuse during the winter, germinating in the spring. Such rubbish should be carefully burned, together with groundsel and other weeds, which act as nurses of this pest. It is especially dangerous to leave old lettuce stumps in the ground.

The turnip is subject to the devastations of two kinds of mildew, which frequently grow in company on the same host plant, and are hardly to be distinguished by the naked eye when both grow profusely. *Oidium balsamii*, the surface mildew of turnips, is however wholly distinct, both in habit and structure, from the true putrefactive mildew, *Peronospora parasitica*, which also attacks this vegetable. Even without the help of a lens the two may be distinguished with care, *Oidium balsamii* causing a thick white bloom on both sides of the leaf, while *Peronospora parasitica* appears as a thinner, more scattered bloom on the under surface only, and generally surrounds pallid discoloured patches on the leaf.

Oidium balsamii grows on cultivated strawberries, as well as on turnips, attacking first their leaves, and then invading the flowers and flower stalks. An allied species, *Oidium tuckeii*, is one of the fungus

pests of the vine. The surface mildew of turnips was first noticed in any quantity in Britain in September 1880, when hundreds of acres of swedes were attacked to such a degree that the boots of persons walking through the fields were whitened with the spores. The fungus attacks the lower leaves first and speads to every part of the infested plant. When viewed with a low power of the microscope, the white coating of mildew presents the appearance of a dense felted mass of spider-like threads, which are dotted all over with countless barrel-shaped spores. Under a high power, it is seen that the fungus growth is wholly superficial, no spawn threads occurring within the leaf. From horizontal matted and jointed spawn threads spring countless vertical club-shaped growths, each of which has three joints, and is surmounted by a barrel-shaped conidium. More than 70,000 of these conidia are produced on every inch of leaf surface, a calculation which gives to every turnip leaf more than a million of spores. The conidia when dusted on to clean glass and kept moist germinate very readily, bursting at one corner. The contained protoplasm streams forth in a thread, from which new clubs arise immediately. This fungus pest injures the turnip by the thick web of mycelium it forms over the organs of transpiration, stopping the transpiration of the leaf and thus arresting growth. Plants produced from early sown seeds are said to be most subject to this mildew, and a humid September following a dry August encourages its growth. Rotten turnip roots should be carefully burned to prevent the spread of the pest.

Peronospora parasitica attacks the cabbage as well as the turnip, and many common weeds, such as shepherd's purse, garlic mustard, lower mustard, bittercress, act as its nurse plants. The stout spawn threads are furnished with suckers which attach themselves to the cells of the leaf, setting up decomposition. The upper part of each flattened fruiting stem is branched and rebranched, and at the end of each little branchlet is borne a comparatively large and nearly globular spore, which usually germinates by bursting at the side. The protruded germ tube has the power of piercing the cuticle of the host plant. The oospores, or resting-spores, which carry on the life of the fungus in a hibernating state through the winter, are smooth outside when immature, but ripe specimens are spiny. In colour they are of a yellowish brown. As these resting-spores exist in large numbers in rotten turnip and cabbage refuse, and many common cruciferous weeds act as nurse plants for the fungus, the importance of burning rubbish and keeping the ground clear of weeds is obvious.

Plasmodiophora brassicae, another fungus pest of turnips, cabbages and allied plants, receives the popular names of club-root, antury, finger-and-toe, hernia or rupture. Clubbing occurs at an early period in the growth of the plant attacked, the rootlets becoming deformed with spindle-shaped swellings. If in July one of these swellings be cut in two, and a thin section taken from one of the exposed surfaces, it will be seen under a low power to be curiously mottled and clouded. When viewed under a high microscopic power the mottling will be seen to result from the presence of a yellowish stringy slime or *plasma*, which in some cases fills certain cells, and in others presents the appearance of strings of slimy protoplasm drawn across from one side to the other. If a thin section of a club be again examined in October under a high power, it will be seen that the plasma has broken up into innumerable minute spherical spores. These spores remain uninjured and in a resting state during the winter in affected plants. In the spring they are ripe and germinate, their protoplasm gradually emerging and becoming free *zoospores*, or animal-like spores, each furnished with a hair-like tail for creeping along or whirling round in any film of moisture. Soon several of these zoospores coalesce, forming a *plasmodium* capable of coalescing with other neighbouring plasmodia, and possessing the power of creeping about by extending arm-like processes. A thin coat of mucilage surrounds the plasmodium, and is often left behind in its progress like the trail of a ship. The spring rains wash these plasmodia into the ground, where they move sluggishly about, and are absorbed into young plants by the rootlets, where they set up clubbing. To deal satisfactorily with this pest, it is necessary in the first place to carefully gather all diseased material into a heap, which must be burned. An alternation of crops should then be resorted to for three or four years, the fungus seeming to be confined to cruciferous plants. Charlock and other weeds, which are also subject to club, should be carefully weeded out, and manures containing sulphur (phosphatic manures) and chlorine (chloride or muriate of potash and common salt) should be carefully avoided, as they encourage premature growth and furnish the dormant spores with abundant sustenance.

Another fungus pest of cabbages and cauliflowers is white rust (*Cystopus candidus*), whose ravages are familiar to all observers of the kitchen garden. The stems become swollen and distorted, and later on seem to be sprinkled with whitewash, so spotted are they with white streaks and blotches. These splashes on a careful examination are seen to be rather elongated swollen pustules, generally arranged in a concentric or spiral fashion, and in size measure half an inch or so across. Under the microscope chains of almost colourless nearly round spores or conidia are found to exist in these pustules. Their method of formation is as follows: From the mycelium, which traverses the host plant by the intercellular passages and is furnished with suckers, there originate simple club-like growths, which become repeatedly jointed till each club supports a short chain of conidia. When a large number of chains have thus been formed in the pustules they burst in an irregular manner, setting free the spores. The conidia mature in damp air or water, their finely granulated protoplasm dividing into from five to eight portions, which are really secondary spores or zoospores. The conidium at this stage is called a zoosporangium, and it proceeds to expel the secondary spores from its apex. At first they remain immovable at the mouth of the burst zoosporangium, then they begin to slightly oscillate, and two hair-like cilia are developed from beneath by means of which they are capable of sailing over moist surfaces. After swimming about for several hours their cilia vanish and the zoospore produces a germ tube or spawn thread of white rust capable of bearing a new series of club-bearing conidia. The wind, birds and insects all help to carry the zoospores from place to place. We have now to consider the

way in which the white rust fungus prolongs its existence through the winter. On examination the spawn is seen not only to bear chains of conidia, which when ripe are blown away by the wind, but also large globular cells called oogonia, containing female reproductive bodies or oospheres. These are generally borne on terminal branches of the mycelium, but are sometimes sessile. Antheridia are also borne on the mycelium, which pierce the oospheres, which are then known as oospores or egg-like spores. These oospores become ripe when the cabbage leaf has decayed, changing from almost colourless smooth spheres to amber-coloured warted globes, which germinate on the wet ground in spring. Their bursting gives rise to zoospores exactly resembling those already described. With regard to the prevention of this pest, the careful burning of all cabbage, cauliflower and turnip rubbish, together with cruciferous weeds, is an urgent necessity. Nor should cabbages, cauliflowers, etc., be grown for two years in succession when white rust has been prevalent.

To recapitulate, we have seen that—

(i.) The potato is a vegetable especially liable to the attacks of fungus pests. *Peziza postuma* covers the plant within and without by a thick white felt of mycelium spawn, and reduces the whole to tinder by exhausting the entire moisture of the stem and leaves. *Fusisporium solani* derives its name from its spindle-shaped spores. Its floccose mycelium reduces the tubers' to putridity by breaking up the cell walls and injuring the contained starch. *Peronospora infestans*, which also attacks tomatoes, causes putrescence in the tissues of the plant by the contact of its spawn, beginning with the lower leaves and travelling through the stem to the tubers. In the case of all these pests the careful burning of potato refuse is important, and with regard to the last, skilful culture, perfect winter storage, earthing up the potatoes and the use of various dressings, are auxiliary measures. *Tubercinia scabies*, or smut, an olive-green or brownish fungus, may be detected by the presence of discoloured blotches on the bark of the tubers. The scabbing of potatoes is due to mechanical causes, such as the presence of lime rubbish in the soil, or to continued drought or superabundant moisture.

(ii.) Onions are subject to the attacks of *Puccinia mixta*, an allied species of which often damages hollyhocks. Another onion disease, *Peronospora schleideniana*, is an ally of the potato disease, *P. infestans*. Like that pest, it induces putridity. *Fusisporium atrovirens* attacks roses, lilies and peas, as well as the onion. Deep trenching, autumn sowing, and the careful burning of mildewed material are indicated here. Dusting with sulphur is the usual remedy in the case of flowering plants. Onion-mould, *Mucor subtiliissimus*, is an extremely minute fungus which traverses the neck of the bulb, and sometimes the bulb itself, with fine threads of mycelium. Infested plants and refuse should be carefully burned.

(iii.) Parsnips are attacked by two species of mildew, *Peronospora nivea*, which sets up putrescence in the leaves, stems and roots, and *Protomyces macrosporus*. All decayed and infested portions of the plant should be carefully burned, and after an attack of mildew parsnips should not be grown a second year in the same place.

(iv.) Pea mould, *Peronospora viciae*, attacks the under surface of the leaves of peas, and is most troublesome in dry seasons. Pea mildew, *Erysiphae martii*, attacks both surfaces of the leaves of peas and beans, and is most prevalent in wet seasons. Infested material must be carefully burned.

(v.) Garden and frame lettuces are subject to the attacks of *Peronospora gangliformis*, a putrefactive mildew whose mycelium sets up decomposition in the leaf and stem. Lettuce rubbish, especially old lettuce stumps, must be burned.

(vi.) *Oidium balsamii*, the surface mildew of turnips, attacks strawberries as well, and early-sown turnip plants are said to suffer most from its ravages. Rotten roots should be carefully burned.

(vii.) *Peronospora parasitica* attacks the cabbage, turnip, and many cruciferous plants. Such weeds should be carefully weeded out, and all infested rubbish burned.

(viii.) *Plasmodiophora brassicae*, club-root, attacks turnips, cabbages and allied plants, the rootlets becoming deformed with spindle-shaped swellings. The careful burning of all diseased material, the extermination of weeds liable to the ravages of this pest, an alternation of crops, and the avoidance of manures containing sulphur and chlorine, are the chief remedial measures.

(ix.) White rust, *Cystopus candidus*, infests cabbages and cauliflowers, causing the stems to become swollen and distorted and blotched. The careful burning of rubbish and an alternation of crops are the best methods of keeping this pest in check.

SPECIAL EXAMINATION OF TEACHERS IN FRENCH.

The School Board for London, in pursuance of a plan to secure that classes in special subjects shall be taught by persons with undeniable guarantees of fitness, have instituted examinations for teachers in Physical Exercises, Kindergarten, and Manual Training, and lastly in French.

The examinations in this subject have been of a very searching character, as may be judged from the character of the questions set, and from the statement of results. At the examination held in June, 145 teachers sat, and of these 18 passed in the First Class, 49 in the Second, and no fewer than 78, or about 54 per cent., failed.

The development of the system of Evening Continuation Schools will cause the demand for teachers of French to increase, and many will probably feel inclined to try for the Board's Certificate of Proficiency with a view to obtaining appointment as special teachers of the subject. To them and to other students of French we trust the papers we are able

to place before them will be useful as guides to the scope of the examination, and for purposes of self-testing.

TUESDAY, 26TH JUNE, 1894.

(Three hours and a half allowed for this paper.)

SECTION I.

[*You are requested to keep the answers to this Section distinct from the other Sections.*]

1. Translate the following passages:—

A. Je suis allé frapper chez le voisin, qui m'a ouvert lui-même et auquel j'ai remis la lettre, enfin terminée et destinée à la veuve de son fils. M. Antoine m'a remercié avec effusion et m'a obligé à m'asseoir.

C'était la première fois que j'entrais dan la mansarde du vieil amateur. Une tapisserie tachée par l'humidité, et dont les lambeaux pendent çà et là, un poêle éteint, un lit de sangle, deux chaises dépaillés en composent tout l'ameublement. Au fond, on aperçoit un grand nombre de cartons entassés et de toiles sans cadre retournées contre le mur.

Au moment où je suis entré, le vieillard était à table, dînant avec quelques croûtes de pain dur qu'il trempait dans un verre d'eau sucrée. Il s'est aperçu que mon regard s'arrêtait sur ce menu d'anachorète, et il a un peu rougi.

Mon souper n'a rien que vous tente, voisin? a-t-il dit en souriant. J'ai répondu que je le trouvais au moins bien philosophique pour un souper de carnaval. M. Antoine a hoché la tête et s'est remis à table.

Chacun fête les grands jours à sa manière, a-t-il repris, en recommençant à plonger un croûton dans son verre. Il y a des gourmets de plusieurs genres, et tous les régals ne sont point destinés à flatter le palais; il en existe aussi pour les oreilles et pour les yeux.

J'ai regardé involontairement autour de moi, comme si j'eusse cherché l'invisible festin qui pouvait le dédommager d'un pareil souper.

Il m'a compris sans doute, car il s'est levé avec la lenteur magistrale d'un homme sûr de ce qu'il va faire, il a fouillé derrière plusieurs cadres, en a tiré une toile sur laquelle il a passé la main, et qu'il est venu placer silencieusement sous la lumière de la lampe.

Elle représentait un beau vieillard qui, assis à table avec sa femme, sa fille et ses enfants, chante, accompagné par des musiciens qu'on aperçoit derrière.

Un philosophe sous les toits. EMILE SOUVESTRE.

B. L'an dernier (1861), par une belle matinée de mai, un passant, celui qui raconte cette histoire, arrivait de Nivelles et se dirigeait vers La Hulpe. Il allait à pied. Il suivait, entre deux rangées d'arbres, une large chaussée pavée ondulant sur des collines qui viennent l'une après l'autre, soulèvent la route et la laissent retomber, et font là comme des vagues énormes. Il avait dépassé Lillois et Bois-Seigneur-Isaac. Il apercevait, à l'ouest, le clocher d'ardoise de Braine-l-Alleud qui a la forme d'un vase renversé. Il venait de laisser derrière lui un bois sur une hauteur et, à l'angle d'un chemin de traverse, à côté d'une espèce de potence vermoulue portant l'inscription: *Ancienne barrière* no. 4, un cabaret ayant sur sa façade cet écriteau: *Au quatre vents. Eschabeau, café de particulier.*

Un demi-quart de lieue plus loin que ce cabaret, il arriva au fond d'un petit vallon où il y a de l'eau qui passe sous une arche pratiquée dans le remblai de la route. Le bouquet d'arbres clair-semé, mais très vert, qui emplit le vallon d'un côté de la chaussée s'éparpille de l'autre dans les prairies, s'en va avec grâce et comme en désordre vers Braine-l-Alleud.

Il y avait là, à droite, au bord de la route, une auberge, une charrette à quartre roues devant la porte, un grand faiseau de perches à houblon, une charrue, un tas de broussailles sèches près d'une haie vive, de la chaux qui fumait dans un trou carré, une échelle le long d'un vieux hangar à cloisons de paille. Une jeune fille sarclait dans un champ où une grande affiche jaune, probablement du spectacle forain de quelque kermesse, volait au vent. A l'angle de l'auberge à côté d'une mare où naviguait une flotille de canards, un sentier mal pavé s'enfonçait dans les broussailles. Ce passant y entra.

Les Misérables. VICTOR HUGO.

SECTION II.

Put into French the following passages:—

(*a*) 'Very well,' said Mr. Pickwick, 'then we will stop here.'

'Lights in the Sun, John, make up the fire; the gentlemen are wet,' cried the landlord. 'This way, gentlemen; don't trouble yourself about the post-boy now, sir. I'll send him to you when you ring for him, sir. Now, John, the candles!'

The candles were brought, the fire was stirred up and a fresh log of wood thrown on. In ten minutes' time a waiter was laying the cloth for dinner, the curtains were drawn, the fire was blazing brightly and everything looked as if the travellers had been expected.

(*b*) 'Come, let us make haste, the train is going to start. Go and take the tickets and I will mind the luggage. My servant was to meet me at the station, but as he never understands what is said to him, I do not know where he is gone.'

(*c*) I have the honour to inform you that owing to the considerable increase in my business I have removed my offices to 20, Fleet Street, to which address all orders should be sent.

(*d*) We are men like you. We are hungry, thirsty, sleepy, hot or cold as you are.

(*e*) Two and two are four.

SECTION III.

1. Give the feminine form of each of the following words:—danseur, gouverneur, roi, empereur, pécheur, loup, tigre, gendre, parrain, compagnon, cheval, pêcheur, neveu, oncle, grandpère, inspecteur.

2. Form adverbs from the following adjectives:—prudent, sage, véhément, lourd, traître, savant, lent, bref, prodigue, commun, gentil, impuni, courant, hardi, sec.

3. Give the 2nd and 3rd person plural of (*a*) the Present Indicative, (*b*) the Future Simple, (*c*) the Subjunctive Present of the following verbs:—faire, dire, vérifier, mourir, agir, tenir, contredire, partager, appeler, végéter.

4. Place after each of the following verbs the preposition it requires (*à* or *de*) before an infinitive present:—gémir, omettre, conjurer, engager, se hâter, finir, craindre, apprendre, hésiter, consentir, se disposer, permettre, négliger, empêcher, exciter.

5. Give the meaning of the following constructions:—

(*a*) C'est un homme comme il faut.
(*b*) Vous vous y prenez mal.
(*c*) Il a beau dire, je le ferai travailler.
(*d*) Je viens de le rencontrer.
(*e*) Pouvez-vous vous passer d'argent?
(*f*) Je vous ferai part du résultat.

6. Correct (if necessary) the past participles in the following sentences:—

(*a*) Les blessés (m.) que j'ai *vu* porter à l'hôpital.
(*b*) Les soldats que vous avez *vu* porter des munitions.
(*c*) La chanson qu'il a *entendu* chanter.
(*d*) La dame que j'ai *entendu* chanter.
(*e*) Les chaleurs (f.) qu'il y a *eu* cette année.
(*f*) Les chaleurs (f.) que j'ai *supporté*.
(*g*) Les dépenses (f.) qu'il a *fait*.
(*h*) Elle s'est *blessé* en tombant.
(*i*) Ma sœur s'est *blessé* la main.
(*k*) Il a *cassé* trois tasses (f.) et les a *payé*.

7. Account for the use of the Subjunctive or Indicative mood in the verbs printed in italics in the following sentences:—

(*a*) Il faut que vous *fassiez* attention.
(*b*) Il paraît que vous *êtes* content de lui.
(*c*) Je crois qu'il *réussira*.
(*d*) Je veux que vous me *répondiez* franchement.
(*e*) Il me semble que vous *avez* raison.

SECTION IV.

Each candidate will be called upon to read a piece of French, and marks will be given for accent and pronunciation.

The Reading Test was the same for all candidates, and consisted of a portion of the passage set for translation from Victor Hugo. It was given a week later than the written examination, and each candidate was heard apart from the others.

NEW PROBLEMS IN ARITHMETIC.

BY T. B. ELLERY, F.R.G.S.,
Vice-President National Union of Teachers.

4TH PAPER.

FOR introduction, *see* October No. of *The Practical Teacher*. For other remarks on the same subject I refer my readers to the *Girls' Mistress* for September 1st, in which appears the first of a series of

papers on *Standard Problems for Girls, and How to Solve them.* In passing let me say:—

1. Every exercise here given will suggest to the practical teacher many others of the same kind.
2. The blackboard should be freely used in the solution of these problems.

STANDARD 6.*

A.

1. In what time will £400 amount to 400 guineas at $2\frac{1}{2}$ per cent. simple interest?

2. At what rate per cent. will £333 6s. 8d. amount to £383 6s. 8d. in $3\frac{3}{4}$ years?

3. What sum of money lent at $1\frac{3}{5}$ per cent. for $2\frac{1}{4}$ years will produce £165 interest (simple)?

4. What principal in $2\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. will amount to £489 7s. 6d., simple interest?

5. What sum of money lent out for 8 years at $1\frac{3}{4}$ per cent. per annum, simple interest, will produce the same interest as £666 13s. 4d. in $2\frac{1}{2}$ years at 3 per cent.?

6. If the 4-lb. loaf cost $4\frac{1}{2}$d. when wheat is 3s. 9d. a bushel, what will it cost when wheat is increased 5d. a bushel?

7. A man spends $\frac{3}{10}$ of his weekly income in food, $\frac{1}{2}$ in rent, $\frac{1}{10}$ in clothes, $\frac{1}{8}$ in other ways, and saves 26s. 6d. What is his weekly income?

8. A has $\frac{3}{10}$ of an estate, and B the remainder. The difference in the value of their shares is 1,055 guineas. Find the value of the estate.

9. What number of lb. is the same fraction of $5\frac{1}{4}$ cwt. as 1s. $6\frac{1}{2}$d. is of £11 6s. $7\frac{1}{2}$d.?

10. A gentleman left £850, which was $\frac{2}{11}$ of his whole estate, to each of his two sons, and the rest he divided equally among his five daughters. What did each daughter receive?

11. A workman lost $\frac{3}{8}$ of his money, and then a gentleman gave him £3. The man had then ·75 of what he had at first. What was the sum he had at the beginning?

12. I divide £33 14s. $4\frac{1}{2}$d. among 26 persons. One half are men, and receive twice the share of the others, who are women. What would be the total sum received by 6 men?

B.

13. If 4 men can do the work of 6 boys, and 12 men can perform a piece of work in 16 days, how many boys will be required to do it in one-half the time?

14. A's age is $2\frac{1}{3}$ of B's age, and B is 8 years younger than C. If A is 44 years old, find the age of C.

15. A garrison has provisions for 800 men for 20 days. All of these men remain for 8 days. How many must then be sent away so that the food may last 16 days longer?

16. I spend $\frac{1}{3}$ of my money, then $\frac{1}{4}$ of what remains, and then ·16 of what still remains. On counting my money I find I have 5 crowns left. What had I at first?

17. The sum of £11·7 was subscribed by a number of men. One-third paid 2s. 6d. each, one-third 3s. 3d. each, and the remainder 4s. each. How many men were there?

18. B's share is £36, which is $\frac{4}{11}$ of C's. C's share is ·025 of A's. Find A's share.

19. 16 sums are set at an examination. A attempts $\frac{5}{8}$ of these, and has $\frac{4}{5}$ of them right. B's correct answers exceed A's by $\frac{1}{8}$, and C's exceeds B's by $\frac{1}{3}$. What proportion does C's correct answers bear to the total number?

20. A money lender borrows money at $2\frac{1}{2}$ per cent. per annum, and lends it again at $3\frac{3}{4}$ per cent. During the year he gains £215. What amount did he borrow?

21. Divide 32 guineas among 6 men, 8 women, and 12 children, giving each man three times the share of a woman, and each child one-half the share of a woman.

22. At 9 o'clock one morning $\frac{3}{5}$ of the children at a certain school were present. By 9.5 40 more had arrived, and then $\frac{7}{10}$ were present. By 9.15 $\frac{19}{20}$ were present. How many came between 9.5 and 9.15?

23. A, B, and C together can do a piece of work in 8 days; A and B together can do it in 12 days. In what time would C, working alone, complete one-half the task?

24. An exercise set in an examination ran as follows:—If 16 tons — cwt. 2 qr. cost £17 10s. 6d., what would you pay for 58 tons 3 cwt. 3 qr.? The number of cwt. was accidentally omitted. If the answer was £61 6s. 9d., find the missing number.

25. 2·25 lb. tea cost as much as 12 lb. of sugar. If sugar cost 2 guineas per cwt., find the cost of a ton of tea.

26. My brother starts on a journey of 15 miles, and walks at the rate of $3\frac{3}{4}$ miles an hour. I start an hour and a half later. At what rate must I travel so that I may reach the journey's end at the same time as my brother?

C.

27. Divide 16 guineas among Tom, Harry, and Fred, giving Tom twice as much as Harry, and Harry one-third the share of Fred.

28. 1 man, 2 women, or 3 boys, can do a piece of work in 19 days. How long would 2 men, 1 woman, and 2 boys take?

29. A man receives from the local authorities a demand note for the payment of 18s. 8d., being the general district rate on account of the house he occupies. This rate stands at 1s. 4d. in the £ on the assessed annual value of the house. Find the assessed annual value of the house.

30. A man found at the end of the Midsummer quarter of the year that his gas meter registered 13,300 cubic feet. He paid his bill, and then at the end of the Michaelmas quarter the meter registered 29,100 cubic feet. Find his gas bill for the quarter ending Michaelmas at the rate of 2s. 6d. per 1,000 cubic feet, and allowing for a further charge of 1s. 3d. for the rent of the meter.

31. A cistern has two pipes, one (A) filling it in 3 hours, the other (B) emptying it in 4 hours. A is turned on alone from 9 till 10 o'clock in the morning,

* This set will be found of great service in examinations for prizes, in pupil teachers' quarterly examinations, etc.

and then B is set to work as well. At what hour will the cistern be full?

32. If £140 is divided between two men in such a manner that $\frac{1}{4}$ of one man's share is equal to $\frac{1}{3}$ of the other's, what is the share of each?

33. The sum of £2,000 is divided between X and Y in such a way that as often as X receives £1 10s. Y receives £2 10s. X then lends his money at 3 per cent. per annum, and Y at $3\frac{1}{2}$ per cent. per annum. Find the difference in their yearly income.

34. I divide ·075 of £15 16s. 8d. among 2 boys and 5 girls, giving each boy five times the share of a girl. What fraction of half a sovereign would each boy's share be?

35. I invest £2,992 10s. in railway shares, which bring me in £$5\frac{1}{2}$ on every £142 10s. invested. What sum must I have in a bank which pays $2\frac{1}{2}$ per cent. per annum that my total income from both sources may be £200?

36. Divide 300 guineas between A, B, and C, giving A £4 to every £5 received by B, and C £12 to every £10 received by B.

37. A can do $\frac{3}{5}$ of a piece of work in 15 hours, and B can finish it in 12 hours. How soon would A and B working together perform the whole work?

38. X starts at 7 a.m., and walks at the rate of 3 miles an hour; Y starts at 10 a.m. from the same place, and walks at the rate of $5\frac{1}{2}$ miles an hour; Z starts on his bicycle at noon, and travels at the rate of 8 miles an hour.

(1) At what time will Y overtake X?
(2) At what time will Z overtake X?
(3) At what time will they respectively reach A——, 40 miles from the starting point?

39. A and B can do a piece of work in 4 days, A and C in 5 days, and B and C in six days. In what time would they all working together complete the task?

40. A fast train leaves one town for another, 200 miles distant, at midday, travelling at the rate of 40 miles an hour. At what time must a goods train, travelling at the rate of 16 miles in 40 minutes, have left the same station in the morning, so as not to be overtaken by the fast train?

ANSWERS.

(1) 2 years.
(2) 4 per cent.
(3) £4,400.
(4) £450.
(5) £333 6s. 8d.
(6) 5d.
(7) £3.
(8) £2,769 7s. 6d.
(9) 4 lb.
(10) £595.
(11) £24.
(12) £10 7s. 6d.
(13) 36 boys.
(14) 28 years.
(15) 200 men.
(16) £2 10s.
(17) 72 men.
(18) £5,400.
(19) 3 out of 4.
(20) £17,200.
(21) Man £3 3s.; woman £1 1s.; child 10s. 6d.
(22) 100 children.
(23) 12 days.
(24) 12 cwt.
(25) £224.
(26) 6 miles an hour.
(27) Tom £5 12s.; Harry £2 16s.; Fred £8 8s.
(28) 6 days.
(29) £14.
(30) £2 0s. 9d.
(31) 6 p.m.
(32) £80; £60.
(33) £21 5s.
(34) $\frac{13}{21}$.
(35) £3,380.
(36) A £84; B £105; C £126.
(37) $13\frac{7}{8}$ hours.
(38) (1) 1 hour $51\frac{3}{7}$ minutes; (2) 3 p.m.; (3) X 8 hours 20 minutes; Y 5 hours 30 minutes; Z 5 p.m.
(39) $3\frac{8}{17}$ hours.
(40) 8.40 a.m.

OUR PUPIL TEACHERS' COURSE.

BY GEORGE COLLAR, B.A., B.SC.,
Head Master of Stockwell Pupil Teachers' School, London.

SCHEME OF WORK FOR THE MONTH.

A.—*English.*

(i.) *First Year.*
The predicate. Parts of the predicate—verb, completion, and extensions.
(*a*) Verbs of complete predication—intransitive verbs, transitive verbs in the passive voice.
(*b*) Verbs of incomplete predication—transitive verbs in the active voice, copulative verbs.
See Daniel, pp. 3, 131–138; Beach, pp. 125–7; Morris, pp. 49, 50, 111–113.

(ii.) *Second Year.*
The following constructions:—Nominative of address, nominative absolute; their treatment in analysis of sentences and in parsing; Latin suffixes. See Daniel, pp. 23, 24, 308–312; Beach, pp. 30, 98, 99, 198–200; Morris, pp. 32, 93–96, 107.

(iii.) *Third Year.*
Greek suffixes; revision of prefixes and suffixes generally. Parsing and analysis. Daniel, pp. 299–313; Beach, pp. 181–187, 198–202; Morris, pp. 89–99.

B.—*Arithmetic.*

(i.) *First Year.—Boys.*—Addition and Subtraction of Fractions. Lock, pp. 94–97; Pendlebury, pp. 91–96; C. Smith, pp. 89–91.
Girls.—Compound Practice. Lock, pp. 142–146; Macmillan's 'Arithmetic for the Standards,' V., pp. 24–28; Pendlebury, pp. 178–181; C. Smith, pp. 143–146.

(ii.) *Second Year.—Boys.*—Percentages, Expression of One Quantity as a Percentage of another, Finding a Required Percentage of a given Quantity. Macmillan's 'Arithmetic for the Standards,' VII., pp. 10–18; Lock, pp. 217–224; Pendlebury, pp. 202–208; C. Smith, pp. 179–182.
Girls.—Same as First Year Boys.

(iii.) *Third Year.—Boys.*—Revision of back rules; theory of the four simple rules. Special attention should be paid to *methods* in working. See the December number on Contracted Division, etc.
Work miscellaneous examples:—Lock's Miscellaneous Examples, 33–72; Pendlebury's Examination Papers, 22–63; C. Smith's Miscellaneous Examples, 31–70.

C.—*Euclid.*

(i.) *First and Second Years and Third Year Girls.*—To end of Proposition XIII.
(ii.) *Third Year.—Boys.*—To end of I. 43.

D.—*Algebra.*

(i.) *First and Second Years and Third Year Girls.*—To end of Multiplication; any cases involving brackets.
(ii.) *Third Year.—Boys.*—To end of Division.

E.—*Mensuration.*

Third Year.—Boys.—To find area of any triangle, (*a*) having given base and altitude; (*b*) having given the lengths of the three sides.

F.—*Teaching.*

(i.) *Second Year.*—Flux's 'School Management,' Ch. II.
(ii.) *Third Year.*—Flux's 'School Management,' finish Ch. VII.

G.—*Geography.*

Physical and political geography of Ireland, with map from memory.

H.—*History.*

To accession of Edward the Confessor.

TEST QUESTIONS ON LAST MONTH'S WORK.

First Year.—1. Give three examples each of sentences having for their subjects (*a*) a verb in the infinitive mood; (*b*) a gerund.

2. Correct or justify the following sentences:—It am I. You was there. Either John or I was there. John and I was there. A row of books are on the shelf.

3. What is a 'mixed number'? Reduce to improper fractions $7\frac{3}{5}$, $15\frac{4}{11}$, $176\frac{9}{12}$.

4. Find (in one step) what must be added to the sum of £27 19s. 5d., £419 12s. $7\frac{1}{2}$d., and £267 18s. $11\frac{1}{4}$d., to make £897 3s. $3\frac{3}{4}$d.

Second Year.—1. What is a complex sentence? Write three complex sentences in which the clause, 'where the violets grow,' shall be respectively a noun clause, an adjective clause, and an adverbial clause.

2. Analyse the following :—

'What thou art we know not ;
What is most like thee?
From rainbow clouds there flow not
Drops so bright to see
As from thy presence showers a rain of melody.'

3. Give the force of the prefixes in the following words :—a-bed, a-rise, a-ware, a-do, a-vert, a-mend, e-special, e-nough, e-merge.

4. What is a compound ratio? By what ratio must the ratio 6 : 11 be multiplied to make it equal to the ratio 13 : 22?

5. Two pint vessels are filled with mixtures of milk and water ; in one the ratio of milk to water is 5 : 6, and in the other 2 : 3. The two are poured together into a quart measure, what is now the ratio of milk to water?

Third Year.—1. What is the force of the prefixes in the following words? Give Greek prefixes having the same meaning :—*ex-tent, de-scend, circum-scribe, un-fit, contra-dict, super-stition, sup-pose.*

2. What is the difference in the origin and in the meaning of the prefixes in the following words?—*de-bar, de-scribe,* and *de-vil ; by-law* and *by-stander ; dis-tance, di-orama,* and *di-lemma ; un-til, un-lock, un-steady,* and *un-animous.*

3. Analyse the following :—

'Tis sweet to hear the merry lark,
That bids a blythe good-morrow,
But sweeter to hark in the twinkling dark
To the soothing song of sorrow.'

4. A farmer planted 114,244 turnips in a field, so that the number of turnips in a row was equal to the number of rows. How many rows were there?

5. A square field contains 10 acres, find to the nearest yard the length of its diagonal.

6. Divide 18 by 35 ; first by long division, and secondly by short division with factors, and compare the number of figures employed in the two cases.

7. Multiply 37·07 by 59·8, and prove the rule for placing the decimal point.

Mensuration.

1. A blackboard, 2 feet 10 inches wide, rests with its lower edge parallel to, and 1 foot 8 inches from, a wall, its upper edge touches the wall 4 feet from the ground. Find the area of the blackboard.

School Method.

Second Year.—In what ways may the memory be aided and strengthened?

Third Year.—1. Explain clearly the chief principles which should guide you in teaching Arithmetic.

2. Multiply 47,895 by 372, and prove your answer by casting out the nines. Explain, as to children, this process of proving sums. In what cases may it fail?

Geography.—(For all Years.)

1. Name six towns in Great Britain which have increased very much in size during the present century, and six which have decreased, stating the chief reasons in each case for the change.

2. Name the railway companies which have termini in London. By which railways and through which ports would a passenger go to France, Holland, Belgium, and Norway, from London?

3. Which of the towns of England have been constituted counties in themselves?

4. Say what you know of Arbroath, Crewe, Luton, Canterbury, Renfrew, Iona, Swansea, and St. Helens.

5. In which parts of Great Britain are the following produced :—Glass, paper, cotton goods, cast steel, nails, machinery, linen goods, pianos, and leather?

6. Give a short account of the fisheries of Great Britain.

History.—(For all Years.)

1. Give an account of the introduction of Christianity by Augustine. What do you know of Columba and Aidan?

2. What is meant by the term Bretwaldа? Say what you know of the most important Bretwaldas.

3. Give an account of the kingdoms of Northumbria and Mercia in their most flourishing days.

4. By what steps did Egbert become over-lord of the whole land?

5. Explain the meaning of the terms :—Scot, wergild, bôc-land, witena-gemôt, frank-pledge, thane, alderman, and ceorl.

Hints on Last Month's Questions.

First Year.—2. (*a*) The definition of an 'improper fraction' must include unity expressed in the form of a fraction, *e.g.* $\frac{7}{7}$, $\frac{21}{21}$, $\frac{785}{785}$, etc. We must therefore say that 'an improper fraction is one in which the numerator is not less than the denominator.' It is not sufficient to say that it is one in which the numerator is *greater* than the denominator, as that does not include the case in which the two are equal.

(*b*) $1920 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5.$
$756 = 2 \times 2 \times 3 \times 3 \times 7.$

The G.C.M. consists of the product of the common factors, viz. $2 \times 2 \times 3 = 12$.

The L.C.M. consists of all the factors of one and those factors of the other which are not common.

L.C.M. $= 1920 \times 3 \times 7 = 40,320.$

Second Year.—1. The Latin preposition meaning *with* is *cum.* When used as a prefix, the laws of sound require that it should be modified so as to agree with the commencement of the word to which it is prefixed. Before a vowel we generally use *co,* as co-equal, co-œval ; in other cases the usual form is *con,* but this generally assimilates to the following consonant :—

commence, compare, combat — *b* and *p* being labials,
conduct, connect, content — *t* and *d* being dentals,
collect, collide, correct, cognate.

2. A ratio is an abstract number which shows how many times one quantity is contained in another. In other words, it is the quotient obtained by dividing the first quantity by the second ; there are consequently three ways of expressing a ratio : $\frac{3}{2}$, $3 \div 2$, or, omitting the line in the division sign, 3 : 2.

We are asked by what ratio (*i.e.* number) $\frac{3}{2}$ must be multiplied to produce $\frac{5}{4}$.

$\frac{5}{4} \div \frac{3}{2}$, that is $\frac{5}{4} \times \frac{2}{3} = \frac{5}{6}$.

3. Since the L.C.M. is the *lowest* number exactly divisible by each of the given numbers, it is evident that the next two numbers which are exactly divisible by each of the given numbers are respectively twice the L.C.M. and three times the L.C.M.

Third Year.—1. Peri-od, a journey *round,* hence the time of a revolution of a heavenly body.

hypo-thesis	a placing *under,* Lat. *sup*-position.
ex-odus	a journey *out.*
ana-tomy	a cutting *up,* hence knowledge gained by cutting up.
dys-pepsia	*ill* digestion.

2. If the decimal system were in universal use, much of the school life of children would be saved. After a few lessons on the place of the decimal point, a child who had thoroughly mastered the four simple rules would be able to deal with decimals, which can be given correct to any required degree of exactness.

Hints on the Work for January.

English.

In addition to its use in the subject of a sentence, and as the complement of a copulative verb, the nominative case is employed in two peculiar constructions : the nominative of address, and the nominative absolute.

The *nominative of address,* or vocative, as it is sometimes called, is the case used in addressing persons :—

'My *lord,* the Duke of Buckingham is taken.'

In analysis, the nominative of address, with words qualifying it, should not be treated as forming a part of the sentence, but should either be written by itself in the sentence column, with the words 'nominative of address' opposite to it, or else be written down below and similarly marked. The same remark applies to interjections, which are in no case parts of sentences.

The *nominative absolute* is a construction in which a noun or pronoun is used, generally with a participle, in place of a subordinate sentence:—'*The Gauls being overthrown,* Cæsar returned to Rome.'

This phrase is equivalent to the adverbial sentence, 'When the Gauls had been overthrown' ; and as this sentence extends the pre-

dicate of the sentence 'Cæsar returned to Rome,' it is an adverbial sentence of time. This will make it clear that the nominative absolute phrase, 'The Gauls being overthrown,' is an extension of time.

In learning the suffixes, it is very important to notice what part of speech is formed by each, and it will frequently happen that the same suffix will form both adjectives and nouns, or nouns and verbs, or adjectives and verbs. In that case it is well to notice that the use of one form is generally older than the other, *e.g.* attend*ant;* here the suffix is from the Latin participle through the French, in which the present participle always ends in *-ant;* consequently this suffix would naturally form adjectives first, and we still speak of '*attendant* circumstances'; then, when applied to a man or woman who attends, it came to be used as a noun, the word man or woman being omitted.

There are some suffixes which call for a special word of remark, as they are used not merely to form a particular class of words, as abstract nouns or diminutives, but have a special meaning of their own. Thus, *-and, -end* are from the ending of the Latin gerundive, a passive participle which conveys an idea of fitness or necessity, thus, *amandus*, fit to be loved, that which ought to be loved. Thus it occurs in multiplicand, dividend, subtrahend, numbers which *have to be multiplied, divided, or subtracted* respectively. The student will now notice the difference between such words as *reverend* and *reverent;* the former denoting a person who *ought to be respected*, the latter being equivalent to a present participle—revering or respecting.

In some cases the same suffix conveys in one case an active, in another a passive meaning; thus, eat-able means able to be eaten, while favour-able has an active meaning; *-und* signifies abounding in, *e.g.*, jocund.

Arithmetic.

It should be carefully noted that much trouble is frequently saved in addition and subtraction of mixed numbers by adding or subtracting the whole numbers first. In multiplication and division of mixed numbers, on the other hand, it is advisable to reduce to improper fractions.

In Practice the great object to aim at is to reduce the number of aliquot parts to the smallest possible number. In last month's issue we dealt with the application of complementary addition to Practice in cases where the price was a little below a whole number of pounds. It would be well always to reduce the shillings and pence to the fraction of a pound, or the cwt., qrs., lbs., to the fraction of a ton, etc. The aliquot parts can then be seen much more readily.

Example. Find the cost of 7 tons 2 cwts. 3 qrs. 12 lbs. at £5 3s. 7½d. per ton.

Most students would begin by taking 2 cwt. $\frac{1}{10}$ of 1 ton, 2 qrs. $\frac{1}{4}$ of 2 cwt., 1 qr. $\frac{1}{2}$ of 2 qrs., 8 lbs. $\frac{1}{4}$ of 2 qrs., 4 lbs. $\frac{1}{2}$ of 8 lbs.; in all 5 lines, but on reducing 2 cwt. 3 qrs. 12 lbs. to the fraction of 1 ton, it is found to be $\frac{1}{4}$. Whatever may be the case with calculations that we meet with in every-day life, in examinations sums are generally set with a view of testing the student's intelligence and knowledge of the best methods of working; and it should be remembered that **a short method not only saves time, but also diminishes the chances of making slips in the working.** Very frequently the work may be shortened by taking the first sum as an aliquot part, not of the top line, but of the second.

Example. Find the cost of 4,164 articles at £15 16s. 6¾d. each. Work thus:—

	£	s.	d.		£	s.	d.
	4164	0	0 = cost at		1	0	0
		15					
15s. = $\frac{1}{20}$ of £15	62460	0	0 =	,,	15	0	0
1s. 3d. = $\frac{1}{12}$ of 15s.	3123	0	0 =	,,		15	0
3¾d. = $\frac{1}{4}$ of 1s. 3d.	260	5	0 =	,,		1	3
	65	1	3 =	,,			3¾
	65908	6	3 =	,,	15	16	6¾

Mathematics.

In Euclid the book-work must be thoroughly mastered, as we shall soon take up exercises and deductions. In Algebra, the only point that is likely to present any difficulty up to the present is the use of negative quantities.

In Arithmetic these are avoided, and the only use of the sign —, minus, is to denote the operation of subtraction, and the idea of this process given in Arithmetic assumes that a quantity cannot be subtracted from another one which is smaller than itself. It is important in Algebra to get a conception of a negative quantity, that is of a quantity less than 0. From our dealings with Arithmetic we are apt to assume that nothing can possibly be less than 0; but let us consider the case of two men, the first neither possesses nor owes anything; his wealth will be represented by 0: the second possesses nothing, but owes £5; clearly he is worse off than the first; his wealth is £5 less than that of the first. We may therefore regard a debt as a minus or negative possession. The rule of signs in addition will readily be seen, if the process is compared to the adding up of accounts, some entries of which represent debts and others credits, or money in hand. The rule in subtraction is perhaps not quite so plain; but see, if we take away + £5 from a person, it is the same as adding to his account a debt of £5, that is adding on — £5. If we wish to substract — 5*a* from 8*a*; we have a similar task to taking off a debt of £5 from a person who not only owes nothing, but who has £8 in his pocket. How can we take away a £5 debt from a person who has no debts? Let us suppose I have two neighbours, one of whom owes me some money, say £20, and the other owes me nothing, but has £8 in his pocket. If I take a debt of £5 from the £20 debts of the first, he will have a debt of £15 still remaining, but what must I do to the second in order to treat him as well as the first? Evidently I must give him £5. So that taking off a debt of £5 and making a present of £5 are really the same thing, and consequently to take — 5*a* away from + 8*a*, we must add + 5*a* on to + 8*a*; the result will be + 13*a*.

Mensuration.—It can easily be shown by Euclid I. 35, 41, that the area of a triangle is equal to half the product of the base and height.

When the three sides are given:—

Let *a*, *b*, *c*, be the three sides and $s = \frac{a + 2 + c}{2}$, that is,

s = half the sum of the sides, then the area is given by the following formula:—

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}.$$

Rule.—Find half the sum of the sides, subtract each side from this half sum separately, then multiply the three remainders and the half sum together, and extract the square root.

History.

In studying this period special attention should be paid not only to the wars with the Danes, and the varying successes of the English and Danes, but to the condition of learning and the ecclesiastical questions with which Dunstan is particularly concerned. As a rule pupil-teachers fail to learn anything about the *history* of King Alfred; they are so fascinated with the legend of his picture-book and his failure to toast the muffins, that the important events and reforms in the reign are passed over. It may be said in passing, that no matter how fascinating these little stories are, they are probably to be classed with the myths of William Tell as having no historical foundation. With regard to Alfred learning to read when he was twelve years old, as the result of a promise from his mother to give a beautiful picture-book to the son who could read it first, it must be said that Alfred's mother, Asburgha, died when he was four years old. Moreover, the story could not refer to his step-mother, Judith, the little French princess, who was only thirteen when Ethelwulf married her, and was not likely to offer to teach her step-sons, mostly older than herself, to read Anglo-Saxon poetry, which she probably knew very little about herself.

The legend of the cakes has probably very little truth in it, and, if it has, no importance should be attached to it.

Scholarship—Fourth Year.

Work for January.

English.—History of Literature to 1553. Progress of the language. Students should borrow Chambers's 'Cyclopedia of English Literature,' or Skeat's 'Specimens of English Literature,' 1394–1579, from a library, and peruse the specimens for themselves. They will thus acquire a practical acquaintance with the writers of this period, and be able to trace the development of the language. There will hardly be time for a real study of the specimens; but even an inspection will do much good. Adjectives and pronouns.

Arithmetic.—Percentages; Expressing one Quantity as a Percentage of another; Finding a required Percentage of a Quantity, Commission, Brokerage, Insurance, Cash Discounts.

Boys.—The Metric system. See Macmillan's 'Notes on the Metric System,' 3d.; work the examples at the end.

Algebra.—L.C.M. Application of knowledge of factors to fractions.

Mensuration.—Area of regular hexagons and octagons.

Mathematics.—Girls, see First Year, Boys.

Geography.—Physical Geography of Europe, and political geography of France and Germany. Maps of Australia and its parts.

History.—To death of Henry II. A great deal of attention must be paid to the details of the Feudal System.

School Management.—Flux, chapters IV. and V.

Domestic Economy.—Food. Necessity of repairing waste tissues and keeping up the supply of heat. Hence need for food containing

nitrogen as well as carbonaceous foods. The names 'flesh-formers' and 'heat-givers' are not good ones, as nitrogenous foods supply heat. Amount of each kind of food required per day. Classification of food-stuffs. Different food-stuffs found in ordinary articles of diet, with rough ideas of their proportionate amounts.

Music.—Major and minor scales and signatures.

TEST QUESTIONS ON LAST MONTH'S WORK.

English.—1. Say what you know of the Saxon Chronicle, or The Vision of Piers Plowman.

2. Give an account of Chaucer's life and works.

3. Give ten words introduced by the Normans, together with their equivalents of Anglo-Saxon origin.

4. Explain clearly what is meant by *case*, and give the rules for writing the possessive case of nouns.

Arithmetic.—A butcher sold 10lbs. of beef at 8d. a pound, 5 lbs. at 7d., and 6 lbs. at 6½d. How many pounds must he sell at 9d. a pound if the average cost is 8½d. a pound.

2. A, B, and C, start on a tour and agree to share the total expenses in the proportion 3 : 4 : 5; A pays bills to the amount of £51 6s. 8d., B, £12 5s. 9d., and C, £20; how much should B and C each pay to A when they settle accounts?

NOTES AND NOTIONS.

BY RICHARD WADDINGTON.

MR. ACLAND has shown the true instinct of statesmanship in dealing with the excessive requirements of the Code. Never did a deputation have so strong a case. Two things were proved beyond the possibility of contention—

1st. The curriculum is already overcrowded.

2nd. To add to it means over-pressure for teachers and scholars.

Here is the analysis of a Time-Table to prove the first of these propositions:—

	hrs.
Total time at disposal—Morning 3 hrs.	
" " Afternoon 2½ "	
$5\frac{1}{2} \times 5 =$	$27\frac{1}{2}$
Religious Knowledge - -	$2\frac{3}{4}$
	$24\frac{3}{4}$
Drawing or Sewing - - -	4
	$20\frac{3}{4}$
Recreation - - - -	$1\frac{3}{4}$
Time left for whole-day scholars -	$19\frac{1}{2}$
" half-timers - - - -	$9\frac{1}{2}$

Nine and a half hours per week for the teaching of the following thirteen subjects:—Reading, Penmanship, Composition, Spelling, Arithmetic, Mental Arithmetic, Geography, English, Map Drawing, Singing, Paraphrasing, Recitation, Physical Exercises. Just over 43 minutes per week for teaching each subject. Imagine the possibility of mastering the arithmetic of the fifth, sixth, or seventh standards in the space of 43 minutes a week for 45 weeks.

* * * * *

'There's a gude time coming.'

THE over-pressure scare of 1884 would never have been more than a passing breeze had the same wise and generous counsel presided over the education of the Nation. Mr. Acland, Mr. Sharpe, and Mr. Kekewich approached the consideration of the protest of the National Union of Teachers with sympathy and ability. On December 1st the deputation appointed by the Executive of the N.U.T. had a preliminary and confidential interview with Messrs. Kekewich and Sharpe. The interview laid bare the necessity for very drastic alterations in the present requirements. Thanks to the two hundred protests from local associations, the anxiety of the teachers needed no demonstration. Practical and sympathetic as usual, Mr. Kekewich sought for suggestion rather than demonstration. It was a curious spectacle. The Secretary's room at Whitehall boasts of neither gas nor electricity. In the dim religious light of four tall wax candles sat the genial Secretary to the Department, surrounded by the representatives of the Union. It was a weird scene. A London fog struggling with 'A remnant of uneasy light.' There sat Mr. Wild, returned from an enforced holiday, to protest against further additions and present requirements. Oh, ye weak-kneed non-Unionists! Think of the veteran Chairman of the Education Committee, slowly recovering from a serious illness, travelling a couple of hundred miles to plead for you. Surely, if shame be in you, this will bring the blush of shame to your cheeks.

* * * * *

MR. ACLAND promised—

1st. The abolition of dictation and the substitution of composition as the test in spelling.

2nd. Two Reading Books instead of three in Small Schools.

3rd. Choice of problems in Arithmetic, and the removal of long and square measures from Standard IV. to Standard VI.

4th. Reduction of the Needlework requirements.

5th. Revision of the Drawing Schedule, and the introduction of alternative courses, especially in the Upper Standards.

6th. A lightening of the requirements in Class Subjects.

7th. Workable Courses for Small Schools.

8th. A reasonable list of Object Lessons should be issued.

9th. Non-enforcement of Compulsory Physical Exercises in Half-Time Schools, and probably Rural Schools.

10th. Partial introduction of Intermittent Inspection.

* * * * *

EVERY teacher will thank Mr. Acland for these very generous concessions. But they fall far short of what is sufficient. Even if Mr. Acland's words mean exactly what we think, they only go a short way on the path of reasonable reform. And so much depends upon the phraseology in the Code of next year that it would be well to rejoice with caution.

* * * * *

THE abolition of dictation is a reform that has lagged too long on the way. When the Primary School teacher looks back over the long years of drudgery in a vain effort to master the eccentricities and niceties of English orthography he must utter a deep sigh of reproach at the perverseness of the educational authorities. One is tempted to say—

'Now let us thank the Eternal Power; convinc'd
That Heaven but tries our virtue by affliction.'

The next problem is, 'What does Mr. Acland mean by "the test of spelling should be composition"?'

So much depends upon the requirements here that one is tempted to add another clause to the Litany.

* * * * *

But Mr. Acland fills us with hope when he says 'He would enumerate some of the points on which they felt that they could at once make changes, *and he did not say that this was the total number.*'

* * * * *

The total number will depend on the teachers. The Union means to have a word in the development of the policy of reform. Even the Christmas holidays of the members of the Executive are to be broken by a special meeting of the Education Committee to consider the alterations to be suggested. This is absolutely essential if the next Code is to give the full measure of relief held out by Mr. Acland. Now is the time for the Union to say what ought to be done, and how it ought to be done.

* * * * *

Rural schools are to find relief in the matter of reading. But is this sufficient? Can there be any hope of meeting reasonable requirements in schools containing seven standards and infants and only one teacher? Without increased teaching power the problem defies solution. Temporary relief may be given by the production of a Course S. in all subjects, but the only statesmanlike solution lies in a more generous treatment of small schools, by the introduction of a graduated grant, and the wide and generous application of the Special Grants under Articles 104 and 105. Two reading books in lieu of three is but a drop in the ocean—the problem demands greater and more statesmanlike treatment than this.

* * * * *

The choice of problems in arithmetic will do something to give the child a chance. At the Scholarship and Certificate Examinations plenty of choice is given, but hitherto the ten-year old scholar has had to sink or swim on one problem. The method of meeting this deserves consideration. In order to save expense, I presume, two cards are to be given out to each scholar in order that he may select one. This hardly meets the demand made. While in the state of sweet reasonableness the Department might as well reprint the cards, and give three straightforward sums and three problems on each card, the scholar to work the three ordinary and one of the three problems. It means a little expense, but that is a small matter when the teacher and scholar are in question, surely. At last the fourth standard is to have some well-earned relief. Not only in the matter of spelling, but in the arithmetic of this standard, the requirements are to be reduced. Long measure and square measure are to go to the sixth standard, where the ability to deal with $5\frac{1}{2}$ and $30\frac{1}{4}$ will be greater than in the fourth. Surely after this recognition of the unfairness of asking the fourth standard to deal with fractions, we shall find Scale Drawing similarly removed.

* * * * *

'The Drawing Schedule needs revision,' says Mr. Acland. Teachers have said so for some time. It is a burden only to be borne to be fully appreciated. The demand of the Executive for alternative courses in drawing has not been made in vain, for Mr. Acland fully admits the necessity. Will South Kensington rise to the occasion? If not it will be the teachers' fault. Mr. Acland's statement shows the battle is half over—the victory cannot be long delayed if teachers are true to themselves.

* * * * *

The Kauri pine, the wonders of the subjunctive mood, the niceties of English grammar, and all the other thousand-and-one monstrosities that the Code allows to be worked in under the name of Class Subjects, are to be decently interred by the issue of a Circular to H.M. Inspectors, limiting the scope and intent of the examination. Bravo!!! Teachers will attend the obsequies in holiday garb. No more will the anxious pedagogue spend his evenings with the cyclopædia looking up the government of the German States for torturing the fifth standard.

* * * * *

Such and so various are the tastes of Inspectors, that the Department will issue a reasonable list of Object Lessons. How certain the Department must be of the vagaries of some of the Inspectors! Too well the Department knows how some of these officials allow zeal to outrun discretion. My contention that sleep would be the best form of Physical Exercise for the eleven-year-old half-timer is accepted by the Department. 'Physical Exercises will not be emphasized in Rural and Half-Time Schools,' says Mr. Acland. And one stands aghast that the suggestion was ever made.

* * * * *

Intermittent Inspection is to be substituted for the annual Examination as soon as the arrangements can be made. Here is the bone of contention. I have steadily advocated the abolition of the Annual Examination. It causes more worry and bad teaching than any other portion of the Code requirements. But its substitute will be equally unsatisfactory unless it is accompanied by—

1st. Abolition of Variable Grants.
2nd. Entry of the Report in the Log Book at the time of visit; and
3rd. Free and fair appeal.
4th. Experienced Inspectors.

Are we to have these necessary adjuncts? Mr. Acland promises to look into the question of a larger fixed grant. I understood him to acquiesce when Mr. Gray demanded the entry of the Report at the time of visit, and the third point will require all the strength of the Union to secure. It might be possible to give the teacher the right to demand a fixed examination when he feared the Inspector. I have no doubt the Department would see the wisdom of this course.

* * * * *

So much depends upon the form in which the alterations are made, that it behoves teachers to be specially alert in order that the full measure of relief may be obtained. Listening to Mr. Acland last Saturday, I could not help contrasting his attitude and bearing with that of some of H.M. Inspectors. Mr. Acland was satisfied that the Union's case was proved beyond question; and, like a true statesman, he bent to the task of reform in no mean spirit. The result is another tribute to the power of the Union. Had

such a Union existed in the days of the Lowe Code, how much might have been prevented. And I want to ask the non-Unionists how much they have contributed to the success.

* * * * *

TRULY the non-Unionist is becoming more difficult to discover year by year. At the last meeting of the Executive, the increase on last year's membership had reached two thousand. Isn't it possible to reach thirty thousand before the month expires? Why, the result of last Saturday's deputation represents more than seven shillings to every teacher in the land. The days of beseeching are past and gone, I hope, for ever, but it is none the less the duty of every Unionist to plainly point out the selfishness of leaving to others the entire defence of the teachers. To parody the poet Mallett, one can fancy the non-Unionist exclaiming—

'While tumbling down the turbid stream,
Lord love us, how we non-Unionists swim.'

* * * * *

THE result of the School Board contests throughout the country must have done much to improve the teacher. Not a teacher or ex-teacher defeated. Messrs. Ansell, Macnamara, and Horobin heading the poll in their respective districts, and Messrs. Peaker, Armitage, and Cryer elected by good and substantial majorities. The vote at Birmingham was simply bewildering in its unmistakeable clearness. Mr. Ansell was elected by a majority that reached hundreds of thousands. Account for it as you will, the vote is indisputable evidence of confidence in the teacher. The time is fast approaching when every School Board will contain a practical teacher.

* * * * *

AND yet Mr. Diggle is reported as saying at the London School Board:—

'He had an objection to electing a man who, like Mr. Sharpe, had been a schoolmaster, to the chairmanship of any public body, because such a man had always had to deal with pupils who knew so much less than himself, and his position was one that was always backed up by the fear of possible corporal punishment.'

What audacious and gratuitous impertinence! I wonder what the Voluntary Teachers' Association thinks of Mr. Diggle. Is this the gratitude for that full-page advertisement advocating the claims of Mr. Diggle and his followers? I have always admired Mr. Diggle, if I have not always agreed with him, but his last speech entirely shatters the very part of the man I most admired. However, I think Mr. Diggle will find that the two or three old teachers on the Board will give him cause to respect, if he does not admire, the teacher. I fancy Mr. Macnamara will remind Mr. Diggle of the one who objected to a schoolmaster.

* * * * *

THE Manchester teachers have beaten the record. The success of the Shakesperean Bazaar was phenomenal. And the success was as well deserved as it was gigantic. I never attended a bazaar where there was so much for the money. The five thousand pounds thus obtained represent steady and enthusiastic work. Laggards were few, and workers many. Hence the success. To the teachers of Manchester I offer my hearty congratulations. If every teacher will follow the example of the teachers of Manchester, Salford, and district, ten thousand pounds will be handed in next Easter. Bolton intends to make an effort early in the New Year. Already 'Sewing Meetings' occupy the ladies. If there are any readers who can send a token, no matter how slight, I shall be glad to acknowledge it. My address is St. James', Bolton.

* * * * *

'CHRISTMAS comes but once a year, and I hope to have a jolly time at Christmas,' said one of my boys in his composition exercise to-day, evidently believing in—

'At Christmas play, and make good cheer,
For Christmas comes but once a year.'

And soon the 'glad New Year' will be upon us. May 1895 surpass your expectations as I hope 1894 has your anticipations. To one and all 'A happy and prosperous New Year.'

PROLOGUE FOR SCHOOL CONCERT OR ENTERTAINMENT.

1.

MY gentle friends, the Prologue that
I would to you repeat,
Contains but four most simple lines,
And trots on fourteen feet!

2.

Yet once before I've tried and failed
This Prologue to recite:
It happened in this very room,
And only yesternight.

3.

I say it happened in this room,
And so it must have done;
Though the school looked like 'The Albert Hall'
And 'Olympia' rolled in one!

4.

You all were there, and each of you
Had brought a hundred more;
While on that bench in fierce array
Sat critics—half a score.

5.

The 'Thunderer,' and 'Twaddlegraph,'
The 'Globe,' and 'Vanity Fair,'
The 'Athenæum,' 'Daily News,'
And 'Standard,' all were there.

6.

Our 'Mercury' an ogre sent
Of stern, relentless look—
The fiend who 'cuts up' boys and girls
Within his pocket-book!

7.

I stood erect—I made a bow—
The first two lines I said—
When something seemed to come and steal
The others from my head!

8.

I stammered, and I stuttered,
And I floundered worse and worse,
Till, Richard-like, I shouted out,
'My kingdom for a verse!'

9.

Then out the critics' pencils flashed
Like daggers in the light;
And each 'Man Jack' of them forthwith
Me down 'An Ass' did write!

10.

Next all the little boys arose,
Each other helped to snuff,
And superciliously exclaimed,
'We thought he was a muff!'

11.

Our master, weeping, wrung my hand:
Though slang he does detest,
He said, 'I bear no malice, boy,
You did your level best!'

12.

But you, the audience, dragged me forth,
And to a lamp hard by,
With hempen cord about my neck
You hung me up—*to dry!*

13.

And long I swung there, till at last
Some one, by pity led,
Approached and cut the rope, and down
I tumbled—out of bed!

14.

Of course, you've guessed it was a dream
That troubled me last night;
So for the *second* time I'll try
Those four lines to recite.

'My gentle friends (*pointing to children*),
our gentle friends—
(In this we all are one)—
We hope you'll neither sleep nor snore
Until our concert's done!'

JOSEPH DESPICHT.

'A QUIET NAP.'

A PLAY FOR BOYS.

BY JOSEPH DESPICHT,

Author of Prize Play, 'In 1999,' 'A Storm in a Tea Cup,' 'Should Men wear Hats?' 'A Funny Shopkeeper.'

CHARACTERS AND DRESSES :—

MR. MARKBY (a merchant) : Ordinary morning dress, grey light overcoat, hat, stick, gloves.

'DOCTOR' BOLDAFACE (a quack) : Very long, black, seedy frock-coat, tall shabby hat, old black gloves, slovenly-looking white tie, black trousers, bad boots.

AN ELECTION AGENT : Light overcoat, brown felt-hat, stick, flower in button-hole.

JAMES AUSTEN (formerly confidential clerk to Mr. Markby) : Ordinary walking costume (rather worn).

THOMAS (footman to Mr. Markby) : Footman's livery.

Scene.—The Library in Mr. Markby's House.

Time.—Six p.m.

Enter Mr. Markby, followed by Thomas.

Mr. Markby (*taking off hat, gloves, and overcoat*) : Thomas, I intend to take a little nap here in the library before dressing for dinner; so be good enough to see that I remain undisturbed for at least half an hour. I will see no one, unless they come upon *very* important business.

Thomas (*taking up hat, coat, gloves, and stick*) : Very good, sir! If Mr. Austen should come——

Mr. Markby : Mr. Austen! Why do you mention him? (*Sharply.*)

Thomas : You gave orders that if at any time—

Mr. Markby : Yes, yes, I know, I know! Rich or in rags—there, there, I'm altogether unstrung! Go, Thomas, go!

Thomas : Shall I call you in half an hour, sir?

Mr. Markby : Yes, do. (*Exit Thomas.*) Dear me, dear me (*yawns*), I never felt so drowsy before! It's the quiet of this house after the hum and bustle of the City, I suppose, added, no doubt, to the wear of this incessant searching after James. Shall I never see him again—never say 'I forgive you'? I loved him too well, perhaps. A son could not have been loved more! And to think that he should rob me! There, there, I must forget it! (*Sits in arm-chair.*) A quiet nap should be an old bachelor's peculiar luxury, so I'll try to get a few winks.

(*Settles himself to sleep—throws handkerchief over his face.*)

Thomas (*knocking and entering*) : Beg pardon, sir! The tailor is below, sir! I thought his business might be important, but——

Mr. Markby : Blockhead! the clothes will fit me as well to-morrow, I suppose; and as for the bill, the tailor's bill may be paid any time these three years. So tell him not to wait, and don't disturb me again!

Thomas : Very good, sir! (*Exit.*)

Mr. Markby (*as he settles to sleep again*) : I wonder if the foolish fellow will let me have a little peace this time. (*Slight pause.*)

Thomas (*putting head in door*) : Ahem! Ahem! If you please, sir, cook says the chimney's on fire! What's to be done, sir?

Mr. Markby : Done, sir? If the cook attempts to faint, show her—mind, only show her—a pail of water, and send for the sweep!

Thomas (*aside*) : What a head! (*Aloud*) I will, sir! (*Exit.*)

Mr. Markby : Now for the third time! (*Settles to sleep—pause.*)

Thomas (*opening door, but speaking from without*) : Ahem! Ahem! If the *Doctor* should call, sir, am I to consider his business important?

Mr. Markby (*loudly*) : *If* he should call, 'yes,' booby! But, as I have not *sent* for him, he will *not* call! (*Enter Thomas.*)

Thomas : But he's in the hall, sir!

Mr. Markby (*rising*) : Then why did you not say so at once? Show him in immediately! (*Exit Thomas.*) That's strange, too, for I do not remember asking Doctor Brown to call to-day.

Enter 'Doctor' Boldaface, rapidly.

Boldaface (*attempts to shake hands*) : Ah, Mr. Markby, how d'ye do, how d'ye do? Or, as we doctors say in our Latin, commong voo porty voo?

Mr. Markby (*drawing back*) : I beg your pardon, my dear sir—but you certainly have the advantage of me!

Boldaface : Don't apologise! Don't apologise! Of course you didn't expect to see me, so pray don't mention the wine and biscuits! Ahem! My name is Doctor Boldaface—I must not say renowned Doctor Boldaface—no doubt you have heard of my extraordinary successes; but Doctor Boldaface can stoop—Doctor Boldaface can stoop!

Mr. Markby : Oh! I am exceedingly glad to hear that! And pray, *Doctor* Boldaface—I must say renowned *Doctor* Boldaface—to what am I to attribute the honour of this visit?

Boldaface : To the interest I take in your welfare, my dear sir! It is wrong, I know, to show so much interest in a stranger (*takes out red pocket-handkerchief, which, pretending to replace, he purposely lets fall*), but I carry my heart upon my sleeve, my heart upon my sleeve; and hearing of your terrible baldness——

Mr. Markby : Baldness! You astonish me more and more! I am not in the least bald!

Boldaface : Partly you are right, sir. You are not *now* bald, but you soon will be, or, as we say in the Latin, 'Baldo-pato arriveso!

Mr. Markby : Indeed! indeed!

Boldaface : Oh, yes, I assure you! Now, I will not talk of myself, but look at that bottle, sir! (*Takes out small phial from coat-tail pocket and holds it to the light.*) Look at it, sir; it is well worth the trouble. I, myself, look upon it with almost the pride of a parent! Well, that little bottle has brought more comfort to the crowned heads of Europe, Asia, Africa, America, and all the islands of the Polynesia, than all the down pillows in existence!

Mr. Markby : Really, I should scarcely have thought it!

Boldaface : Need I say, sir, that that little bottle contains a quantity of 'Doctor' Boldaface's World-famed Hair Restorer! Does not the blood thrill at the sound? Does not each particular

hair stand on end at the very sight of the bottle? And do not the words of the Immortal Bard at once apply,—

'It comes as a boon and a blessing to men,
Like the Pickwick, the Owl, and the Waverley Pen!'

Mr. Markby: Why, you abominable old——

Boldaface: Don't flatter me, sir, I can't bear it! I might go on telling you of the wonders that little bottle has performed 'ad infifitum,' as we say in the Latin, but I forbear; and will only relate one specimen of the rest, which happened just before Mr. Gladstone sent for me, when his hair was likely to come off through those Bulgarian Atrocities. (*Mr. Markby throws himself into his arm-chair and looks the other way.*) Well, sir! It was while I was in the Chinese Empire, I sat one morning in my bungalow, as we say in the Greek, when a Chinaman came to me in great perturbation of spirit, saying that, in an unfortunate encounter with his wife the previous evening, he had lost his pigtail. Knowing the value these people put upon those useless appendages, I bade the fellow kneel before me; and forthwith proceeded to pour upon my patient's then perfectly-polished pate a portion of this most potent potion. And, would you believe it, sir, in the scarcely perceptible space of seven short seconds his smooth scalp was smothered with a wild crop of the most luxuriant locks, and that man now serves all the London and Paris barbers with hair from his own head!

Mr. Markby (*sharply, and turning head*): What is the——

Boldaface: You naturally ask what is the price of this inestimable article! It is a delicate question, but fortunately I have an answer ready. I feel sure that a gentleman of your wealth and position five shillings will neither make nor break, and that you will exclaim with me and the Latin Poets, 'Pomatum bon marchy est!'

(*Offers bottle.*)

Mr. Markby (*starting up*): Mr. Boldaface, when I say that your impudence and audacity astound me, it is only like trying to smother a volcano with a sheet of blotting-paper! If you don't at once rid me of your detestable presence I shall—well, take forcible means of expelling you. Now go! (*Partly exit Boldaface.*)

Boldaface (*returning*): Perhaps the price is too——

Mr. Markby: Will you go? (*Partly exit Boldaface.*)

Boldaface (*returning*): I quite forgot to mention——

Mr. Markby (*following him to door*): Will—you—go?

(*Partly exit Boldaface.*)

Boldaface (*as before*): May I show you another——

Mr. Markby (*as before*): Go, I tell you!

(*Partly exit, as before, Boldaface.*)

Boldaface (*as before*): You'll be sorry for this!

Mr. Markby (*taking Boldaface to door*): Thomas! Thomas! See this gentleman past the coats!

Thomas (*without*): All right, sir! This way out!

(*Scuffle heard. Exit Boldaface.*)

Mr. Markby: Really, I was very near losing my temper! I am not sure that I have breath enough to sleep with! Whew! Doctor, indeed! Miserable quack! (*Settles again to sleep. Slight pause.*)

Thomas (*without, knocking*): Sir! If you please, sir! Ahem!

Mr. Markby: Oh! come in, and drive me mad at once, do!

(*Enter Thomas.*)

Thomas: A man in the hall says he wishes to see you on private and important business, sir—shall I show *him* in?

Mr. Markby: Private and important! Yes, yes, I suppose I must endure it. Did he say private and important, Thomas?

Thomas: Oh, yes! I asked him that before I let him in.

Mr. Markby: What sort of looking man is he?

Thomas: Well, he's too smart for a tax collector, and too horsey for a begging-letter chap. He'd about do for a policeman in plain clothes, only his trousers ain't blue!

Mr. Markby: Well, show him in! (*Exit Thomas.*) Can it be a police officer? Am I to hear of James at last? I must force myself to be calm!

(*Enter Thomas and Election Agent. Thomas retires.*)

Election Agent: Good day, sir! hope you're well, sir! Pretty fine weather this for the time o' year!

Mr. Markby: Yes, yes! but your business, your business! Is it of James Austin?

Election Agent: Oh, no, sir! much more pertickler than that, whoever he is. Why, I've called to ask you to give your vote at the comin' election to Adolphus Tomfoodlecum, Esq.!

Mr. Markby (*aside*): Another disappointment! Shall I never, never hear—(*aloud*) Well, may I ask in what interest this Adolphus Thingumabob stands?

Election Agent: Oh! I thought everyone knew that. In the Lib'ral interest, of course!

Mr. Markby: Then I'm a Conservative—so that settles the matter! Good-day!

Election Agent: Not at all, sir! Not at all! You see, sir, Adolphus Tomfoodlecum, Esq., is really put forward by the Conservatives, but being between ourselves—such a glorious duffer, as one may say, his party think he'll do them more good by making a *hass* of himself among the Lib'rals than by sittin' with 'emselves! Ha! ha! do you see the joke? Sharp fellows, the Conservatives!

Mr. Markby: Oh! yes, yes! It's a capital joke—but why present him at all?

Election Agent: Well, I don't rightly understand it myself—it's the first time I've been on this election business—but they say the seat's been in the family for years, and he's a sort of born to it.

Mr. Markby: Oh! indeed! And pray, what are this gentleman's opinions on the burning questions of the day?

Election Agent: Oh, all first rate, sir, first rate! They were wrote for him by a peer of the *rellum*, I believe!

Mr. Markby: Ah! ah! nothing could be more satisfactory than that! But to come to particulars—what does he think of Home Rule, for instance?

Election Agent: Home Rule, sir? Well, he certainly don't look like a man as would put up with a mother-in-law.

Mr. Markby: Oh, you think not! Then there's Free Trade—what are his views about that?

Election Agent: Ah! econermy, I've heard, is his strong point—his forty! If there's one thing he does know, it's how to spend the money! His opinion on Free Trade is sought 'igh and low. Says he to a deppitation of washerwomen only the other day, says he, '*Free-Trade-won't-wash!*' Oh, he's very funny, is Adolphus!

Mr. Markby: There, I see you know very little of politics, but at least you can answer this. Supposing your master were returned, would he consent to prevaricate a little—now and then—for the country's good, of course?

Election Agent: To be sure!

Mr. Markby: And would he occasionally, for the sake of his party, consent to vote against his conscientious opinions?

Election Agent: Certainly! Certainly!

Mr. Markby: And would he in the last extremity consent to betray the best interests of his country in order to keep the seat—always, of course, for the sake of his dear constituents?

Election Agent: Why not? Why not?

Mr. Markby: Then tell Adolphus Tomfoodlecum from me that he's a rogue and a vagabond, and I'll not vote for him! Good-day! (*Indicates the door.*)

Election Agent (*returning*): But these things are done every——

Mr. Markby: Not a word more. The door is there!

Election Agent: But these are trifles that——

Mr. Markby: Will you leave this room?

Election Agent (*going*): I *am* a-leavin' of it, ain't I? (*Returns.*) Surely you wouldn't have a man——

Mr. Markby (*rings hand bell. Thomas enters quickly, as if he had been at keyhole*): Thomas, the door!

Thomas (*to Agent*): Emergency exit this way!

(*Exit Thomas and Agent—street door bangs.*)

Mr. Markby: Vote for him, indeed! I should like to horsewhip the scoundrel! Many men have been transported for less! (*Sits.*) My nerves seem quite shattered to-day. I must make just one more attempt to sleep.

(*Covers face with handkerchief as before—slight pause.*)

(*Enter Thomas and James Austen softly.*)

Thomas: Don't wake him yet, Mr. James, he seems so tired and nervous like!

James Austen: Very well. Leave me now! (*Exit Thomas.*) He sleeps still (*going near*). How shall I speak to him? I dare not pronounce his name!

Mr. Markby (*in his sleep*): James! James! Come to me!

James Austen (*nearer still*): Master! Sir! You called me!

(*Looks imploringly towards Mr. Markby.*)

Mr. Markby (*gradually awakening*): Who calls? (*No answer—removes handkerchief.*) I really have been asleep this time—and yet—(*seeing James*)—what! James Austen here, or am I asleep still? The very face I was dreaming of; the very name on my lips as I awoke! Speak to me, James Austen, or I shall believe you are not flesh and blood! (*Sinks back in chair.*)

James Austen: Oh, sir! What can I say—what do? I came full of words of penitence, but they die away on my lips. Even now your face tells of the love of a father lavished on a heartless boy, and I cannot even ask to be forgiven. But let me at least confess my crime, and tell how I have suffered for it, and then punish me, spurn me, if you will.

Mr. Markby: Go on! go on! Tell me all!

James Austen: The cheque—the cheque you trusted me with—I stole and changed for gold; thinking to become rich and happy at a blow. Instead of spending it in your interest abroad, I squandered it on myself. The possession of the money made me mad, and I thought, by gaming, I might make it a hundred times more! But it went, piece by piece, until at last I found myself a beggar.

did not then know that you in your great love had kept my crime a secret. I only thought of being tracked, hunted down, and arrested. This fear haunted me until I could find no rest.

Mr. Markby: What did you do for money then?

James Austen: I got work here and there, but in every fresh face I thought I saw an officer. At last I fell ill of a fever at a house in a little street of Paris. During my sickness—I suppose in my ravings—I spoke of my sin; for as soon as I had sufficiently recovered, the good old woman, who had nursed me, prayed me to return to my father (for so she thought you) and ask his forgiveness!

Mr. Markby: God bless her!

James Austen: The sickness and fear of dying in my guilt had brought me to a better state of mind, and, for the first time since that fatal day, I prayed earnestly for strength to see you once again and beg to be forgiven! (*Kneels.*)

Mr. Markby (*bending over James*): My boy! My boy! Don't kneel! Don't kneel to me! I, too, have something to confess; something to be forgiven! The blame for this unhappy deed must fall on me. Had I told you before what I am about to tell you now, the misery of the past year might have been spared us both! You have perhaps often wondered, my boy, why I have loved so dearly one who bears not my name. Listen, I will tell you!

James: Another time, sir; don't tire yourself now!

Mr. Markby: No! I must do it at once. Many years ago your father and I were clerks in the same bank, and a friendship sprung up between us such as seldom exists between two young men. When I was twenty, and your father twenty-three, a gang of thieves conspired to rob the bank, and cast about for some of us clerks to make tools of. With promises of great rewards, and visions of glittering gold before my eyes, I consented to betray my trust. The plans were laid in secret, and the evening fixed upon arrived.

James Austen: My own father, where was he?

Mr. Markby: About an hour before the appointed time I was sitting in my room, alone, stifling my conscience as well as I could, when your father knocked and entered. With the impending crime full on my mind all my love seemed suddenly turned to hatred, and I asked him rudely what he did there at that time of night.

James Austen: My poor master!

Mr. Markby: He told me, in a voice so full of love, that the tones ring in my ears now, that he had come to prevent me committing a crime. I laughed bitterly, and asked him how he dared accuse me of such a thing. He told me he had heard of the proposed robbing of the bank, and that my altered manner of late had convinced him that I had been caught in the toils. At first I assumed indifference; but, as the time drew nearer and nearer, I grew furious. I at last acknowledged my share in the conspiracy, and vowed I would keep my word—daring him to do his worst! I attempted to dash past him, but he caught me in his powerful arms, and said I should kill him first!

James Austen: How good of him!

Mr. Markby: We struggled long and madly, and then, in my frenzy, I cruelly struck him! Oh! that horrid blow!

James Austen: You did not strike him?

Mr. Markby: Yes! I see, even now, his face covered with blood, and lined with anguish, as in that terrible moment!

(*A pause, Mr. Markby overcome.*)

James Austen: You take it too much to heart, sir, you gave way then!

Mr. Markby: No, but his superior strength at last prevailed; and when the time of rendezvous was gone, and he knew the plot must fail, he left me. What passed afterwards in that long and fearful night no one will ever know. It is enough to tell you, James, that in the morning I was a changed man. I saw then the folly of a thirst for gold, as you see it now, and my good angel has shown me the priceless value of true friendship.

James Austen: My father forgave you, I am sure?

Mr. Markby: Some years after, your father, who never again even mentioned that awful night, died, died in my arms; and I thought to make some amends for the wrong I had done him, by taking care of you, his fatherless and motherless boy. In my love and care for you, I had almost learned to forget my own crime; and as I grew richer year by year it was a comfort to me to think that you were above temptation!

James Austen: You have indeed been only too, too kind, sir!

Mr. Markby: Oh! that I had warned you before! Then, when the conviction forced itself upon me that *you* had betrayed me, it seemed to come as a punishment for that wicked blow! Oh! James, I have yearned for forgiveness like you! Let us both forget the past, and may the miseries we have both suffered be as fires purifying our future lives!

James Austen: Oh! how shall I ever thank you?

(*Noise outside.*)

Thomas (*without*): I tell you, you can't go in!

Enter Boldaface (*Thomas taking hold of his coat-tails*).

Boldaface: I beg ten thousand pardons, but have you seen my 'mooshwar,' pray forgive the Latin, it will bubble out! Ah! (*picks up handkerchief*) here it is! Don't mention your boy's rudeness—(*Thomas threatens him*)—your *man's* impudence. I forgive and forget; I forgive and forget. By the way, may I show you another little—(*dives into coat-pocket*).

Mr. Markby: No, No, No! Show me nothing but a clean pair of heels! And yet, stay! I have an idea! James, allow me to present you to Doctor Boldaface, renowned Doctor Boldaface!

(*Thomas retires.*)

Boldaface: Delighted I am sure! May I show you a little——

Mr. Markby (*introducing them*): Mr. James Austen—Doctor Boldaface. There, now you know one another! Now listen, doctor. I have received good news to-day! I am almost beside myself with joy! Dinner must be nearly ready; you shall stop and dine with us! (*Boldaface looks highly pleased.*) Now, no refusal! And, doctor, you shall tell this gentleman some of the wonders that little bottle of yours has performed! What do you say, James; you want cheering up!

James Austen: Nothing would give me more pleasure, if it is your wish.

Mr. Markby: And you, doctor?

Boldaface (*rubbing hands*): Delighted I am sure! Positively delighted! It was in the wilds of Barbary, as we say in Egypt, the Emperor's horse had become bald from the point of its nose to the tip of its tail. I was sent for. Stroking the hairless creature's forky mane, I called for an empty bucket of cool spring water. Into this I dropped a single drop of my miraculous mixture. When, would you believe it——

Thomas (*who had entered a few moments before*): Dinner is quite ready sir!

(*Boldaface offers to throw bottle at Thomas.*)

Mr. Markby: Oh, thank you! We will dispense with dressing and come at once. And, Thomas, covers for *three!*

Thomas: Why, is that old——? I beg pardon, sir, you said lay for *three?*

Boldaface: Yes, calves! I shall do my friend Markby the honour of dining with him to-day! 'Ally voos on!' as we say in China, (*waving hand to Thomas*); 'slope!' as we say in Japan!

(*Exeunt, Boldaface, taking left arm of Mr. Markby and right arm of James—all very jubilant except Thomas.*)

CURTAIN.

CONVERSATIONAL LESSONS IN CHEMISTRY.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Chemistry, S. and A. Department, Lecturer in Chemistry to the Middlesex County Council, and in Physiography to the Birkbeck Institution, Chancery Lane, E.C.

For particulars of the List of Chemicals and PRACTICAL TEACHER Set of Apparatus for working the experiments referred to in these lessons see numbers for January and February 1893.

LESSON XIX.—COPPER.

To-day I wish to draw your attention to another very useful metal, which is a component of the ore I now hold in my hand. I will pound a portion of it and then heat it in this hard glass test tube. What do you notice on the sides of the tube, Trixie, now that it has cooled down? Is it not sulphur, sir? And what does that teach you? That the ore in question contains S as one of its ingredients. Exactly. I don't suppose you would ever guess what the metal under study really is, so I will at once enlighten you by informing you that it is copper (Cu), of which here are some specimens in sheet and in wire. The Latin name of the metal is cuprum (from the island Cyprus, whence the symbol Cu). The ore exhibited is called copper pyrites, because fire (Greek, *pur* or *pyr*) causes it to yield copper by burning out the S. Well, Tom? Is there nothing else in the ore except S and copper? Yes, it contains iron (Fe). Where do you think the ore came from? From Cornwall. Yes, you have all learnt that tin and copper are plentiful in the S.W. corner of our island, and you have now to add that it is found there as copper pyrites—a compound of Cu, Fe, and S, from which it is obtained by roasting.

Let us turn to the metal itself and find out some of its characteristics. Charlie shall begin. It is of a red colour, sir. Very good; do you know of another metal of this colour? I see you hesitate, and you are right in doing so, for there is no other red metal in existence, a fact which marks out the metal from all others, but its colour is not of much use, so now let Bob proceed. It must be an excellent conductor of electricity, sir, because it is used so extensively for that purpose. That is perfectly correct. Cu is not the best conductor, but there is no metal of equal cheapness which can be compared with it in conducting power, for which reason it is used almost exclusively as a conductor. Well, Minnie? Isn't brass a kind of copper, sir? Hardly, but there is copper in it; indeed, it is a mixture of copper and zinc in the proportion of about two parts to one. What name do we apply, George, to such a mixture of metals? We call it an alloy, sir. Quite right, and no alloys are so useful or important as those of copper. Brass, you all know, is of wide application. Bronze, of which coins are made, bell metal and speculum metal, so useful in making mirrors, as well as German or nickel silver, are all alloys of metal. Silver also is always alloyed with copper, which makes it better able to withstand wear and tear. Are they all mixtures of Cu and Zu, sir, like brass? By no means. The table on the blackboard will satisfy your curiosity in this particular.

Alloy.	Constituents.
Brass	Copper and Zinc.
Bell Metal	Copper and Tin.
Gun Metal	" "
Speculum	" "
German Silver	Copper, Zinc, and Nickel.

What does the wire teach us, Annie? That Cu is very ductile. True, and ductility is a most important quality in a metal. Compare iron or steel wire with copper wire, Bob, and tell us the chief difference between them. Here are some specimens. Iron is more brittle than Cu, sir, and it bends more easily. Yes, and this will explain why copper wire is so widely used, especially when I add that it is very tenacious and does not easily break. What does the sheet tell us, Minnie? It tells us of the thinness to which copper can be hammered without breaking. Exactly; copper is, as you see, very malleable. Heat your copper sheet in that bunsen, George, and tell us what you learn therefrom. I learn that copper oxidises, when heated, and that copper oxide is black. Very nicely put, and remember that this same black copper oxide is very useful to the chemist, as it readily gives up its O when heated in the presence of a body which, like H, will readily combine with O, wherefore the oxide may be described as a good *oxidising* agent. Tell me, Charlie, what takes place when a stream of H is passed over red hot copper oxide. If you can put your answer in the form of an equation it will be better. CuO is the formula for copper oxide.

$$CuO + H_2 = H_2O + Cu.$$

Quite right, and, by way of reward, you shall perform this experiment for us.

Here is a familiar substance, bluestone. Make a solution, Arthur, and dip your knife in it. Ah, you look surprised. Tell the class what you think. Well, sir, this red stuff on my knife must be copper, and so there must be copper in bluestone. Right, bluestone is a compound of sulphuric acid and copper, and so is called—what, Winnie? Copper sulphate, I should think, sir. Very true; it is the copper salt of sulphuric acid. Notice how pretty it is, and remember that all salts of copper are coloured, some red, some blue, and some green. We can prepare copper sulphate by heating Cu in strong sulphuric acid. Here is a pretty stone which is found native, and is used for brooches. It is called *malachite*, and is copper carbonate. Place a strip of Cu in nitric acid. Observe how readily the acid attacks it. Those dense red fumes consist of nitrogen peroxide. What is the bluish-green substance in that tube, Ernest? It is copper nitrate, is it not, sir? Yes, and now for another salt of Cu, with which all are familiar, a green one this time. Put a spoon in vinegar and let it remain outside for some time. Upon the spoon will form a green substance, which somebody shall name. Well, Tom? It is verdigris, sir. Yes, and everybody knows that verdigris is a poison; indeed, *all soluble copper salts are poisonous*, so that we must take care to keep acid substances out of contact with copper cooking vessels, or poisoning will result. What is verdigris, sir? It is the copper salt of acetic acid, hence called copper acetate.

In bringing our lesson to a close I would impress upon you the following points for remembrance:—(1) The commonest copper ore is *copper pyrites*. (2) *Bluestone* is copper sulphate, *malachite* copper carbonate, and *verdigris* copper acetate. (3) Copper is an excellent conductor. (4) All soluble salts of copper are poisonous. (5) Alloys of Cu are very valuable, *e.g.*, brass and bronze.

NEW COMPOSITION STORIES.—STANDARD V.

Suitable for 'Unseen Tests' in Reading also.

227.

A Wise Elephant.—An elephant-keeper noticed that when his pets were fed on cakes and sweetmeats by the children they became unwell. Not being able to stand in front of them all the while, he had a notice painted warning visitors not to feed them. He was in the habit of pointing to this when he saw anyone about to drop a cake or nut into the outstretched trunk. The keeper was sorely puzzled to find out who tore the notice down whenever his back was turned, until one day he caught one of the wise brutes dexterously removing it from the peg on which it hung, and throwing it into a corner where it would not be seen.

228.

Justly Punished.—A clergyman in London was one night driven home, and paid the cabman what he supposed to be two shillings. He had taken the coins from his waistcoat pocket, but as soon as they had passed from his hands he noticed their peculiar glitter, and said: 'Stop, cabman! I've given you two sovereigns by mistake.' 'Then you've seen the last of them,' said the cabman, whipping his horse and driving briskly away. Then the gentleman felt again in his pocket, and found that he had given the man two bright new farthings, which he had that day received, and was keeping for his children.

229.

English at Last!—A Yorkshire farmer had occasion to go to France. When he arrived at Calais he was surprised to hear the men speaking French, the women speaking French, and even the children jabbering away in the same tongue. In the height of the perplexity which this occasioned he retired to his hotel, and was awakened in the morning by the cock crowing, whereupon he burst into a wild exclamation of astonishment and delight, crying: 'Thank goodness, there's English at last!'

230.

King John and his Hostage.—John, king of France, left in England two of his sons as hostages for the payment of his ransom. One of them, tired of his confinement in the Tower of London, escaped to France. His father proposed instantly to take his place; and, when the principal officers of his court remonstrated, he said: 'I was permitted to come out of the same prison in which my son was, in consequence of the treaty, which he has violated by his flight. I hold myself not a free man at present, and therefore return to my prison. I am engaged to do it by my word; and if honour were banished from all the world, it should have an asylum in the breast of kings.' The monarch accordingly proceeded to England, and became the second time a prisoner in the Tower of London, where he died in 1384.

231.

Improving the Occasion.—A respectable surgeon in London, making his daily round to see his patients, had occasion to call at a house in Charing Cross, where he left his horse to the care of a Jew boy, whom he casually saw in the streets. On coming out of the house, he naturally enough expected to find his trusty servant treating himself to a ride; but no—the boy knew the use of time and value of money a little better;—he was letting the horse to little boys in the street, a penny a ride to the Horse Guards and back!

232.

Pluck!—All Australian boys are taught the necessity of guarding against snake-bites. The treatment of such wounds is a necessary

part of their education. One day two little fellows, six and eight years old, went into the bush to play. The smaller one, chasing a rabbit into a hole, pushed in his hand, and brought it out quickly with the head of a venomous snake attached to one of the fingers. 'Quick, Charley!' he cried, putting his hand down on a stump. 'Chop off my finger! The snake has bitten it.' Charley, without a pause, lifted his axe and chopped off, not only the damaged finger, but two of the others as well. Then the boys ran straight into town, over a mile distant, and sought a surgeon, who dipped the injured members in ammonia before dressing them. Imagine the pain of such a burning bath!

233.

THE ACCOUNTS TROUBLED HIM.—An old lady who keeps a small grocery store rejoices in the name of Mrs. Mary Mum. Her education when a girl was limited to pothooks and hangers, and customers' accounts were kept chalked up behind the shop-door. But the evil day came when poor old Mary was confined to her bed by a long illness. Here arose the difficulty. When customers came to pay their weekly accounts the shop-door figures were Greek to old Johnny her husband, who with many groans had, as each customer turned up to pay, to take the shop-door off its hinges, and carry it up a difficult staircase for Mary to decipher before he could settle the account.

234.

BRAVELY DONE!—A story came from Switzerland a year ago of a mountain-guide, whose name was not preserved. He, with two others, was leading a party over one of the most precipitous passes of the Higher Alps. The men, as is usual, were tied to each other by a long rope. As they scaled the wall of ice they slipped on the edge of a frightful chasm. This man was at the end of the rope. Without his weight there was a chance for the others to regain their footing; with it there was none. He cast a glance down at the dark abyss, filled with fathomless snows, then drew his knife from his belt, saying quietly to the man next to him: 'Tell mother how it was, José.' He cut the rope and fell, never to be seen again.

235.

A CHEAP WATCH.—A sailor once went into a watchmaker's shop in the City, and handing a small French watch to the watchmaker, asked how much the repairs would come to. The watchmaker, after examining it, said it would cost more for repairing it than the original purchase. 'Oh, if that is all, I don't mind,' replied the sailor; 'I will even give double the original cost, for I have a veneration for the watch.' 'What might you have given for it?' enquired the careful watchmaker. 'Why,' said Jack, twitching his trousers, 'I gave a French fellow a knock on the head for it, and if you'll repair it, I'll give you two.' The watchmaker begged to be excused the job.

236.

A CUTE BOY.—A bright little boy, about four years of age, was at a gentleman's house one evening recently with his parents. The gentleman gave him a couple of new sixpences. He laid them on the table, and putting his finger on one said: 'This one I am going to give to the heathen, and the other I am going to keep myself.' He played with them a while, till one of them finally rolled away, and he could not find it. 'Well,' said the gentleman, 'my lad, which one have you lost?' 'Oh,' said the boy, 'I have lost the one I was going to give to the heathen.'

237.

THE CZAR AND THE SENTINEL.—One day last winter a member of the Czar's family told him that the sentinel stationed at a certain railroad crossing in St. Petersburg had refused, although the next train was not due for five minutes, to raise the bars for his carriage, declaring that he had strict orders to allow no vehicle to cross until the train had passed. The Czar commended the sentry's conduct, and remarked that strict discipline was the very life of the army. His kinsman replied, with a laugh, that had the Czar himself driven up to the crossing, discipline would surely have given way before the Imperial presence. The Czar declared that he would put the matter to a test, and a day or two later he presented himself at the crossing at a moment when the bars were lowered before the passing of a train. The sentinel declined to raise them. He was commanded to open the gate by the express authority of his Majesty. But, although perplexed and troubled by the dilemma, he stood firm, and answered that he could not disobey orders. Just then the train rolled by, and the Czar, laughing heartily, made the soldier a handsome present, and praised him for his attention to duty.

238.

'PRENTICE PILLAR.'—A few miles from Edinburgh, among the hills, is Roslin Chapel, which has been famous since the fifteenth century for the beauty of its interior, especially its richly carved pillars. One of the columns is larger and much finer than the others. Its bold designs and delicate tracery are evidently the work of more skilled hands than those employed on the rest of the chapel. The story of this pillar is that the sculptor, who was at work for years upon the chapel, was ill for a long time, and that one of his apprentices during his absence designed and carved the pillar. The work was so superior to his own that the master, on his return, in a jealous rage killed the boy with his mallet. The pillar has ever since been known to fame as the 'Prentice Pillar.'

239.

CHEAP SHOES!—A clever fellow, whose shoes were the worse for wear, hit on a plan to get a pair for nothing. Having arranged with a companion as to the plan, he entered a shoemaker's shop. He laid his hat upon a table near the door, and having got a pair that suited him, gave the sign by stamping his foot on the floor, when in rushed his companion, and, snatching up his hat, ran off with it. The shopkeeper, seeing what had happened, said to his customer: 'There's a man off with your hat—after him, and you'll catch him.' It is needless to add the shopkeeper never saw his shoes again.

240.

A SHREWD JUDGE.—The following is told of a judge before whom a man was being tried for stealing the gold watch of a lady as she was entering a tramcar. The man declared that the watch was his, and that the woman was mistaken in identifying it as hers. Suddenly the judge asked: 'Where's the key?' The prisoner fumbled in his pockets, and said he must have left it at home. The judge asked him if he had wound the watch frequently with the key, and he said, 'Yes.' Then a key was procured, watch and key were handed the prisoner, and he was told to wind the watch. He opened the case, but could not find any place to use the key, for the simple reason that the watch was a keyless winder.

241.

TRUE NOBILITY!—The Neapolitans in general hold drunkenness in very great abhorrence. A story is told of a nobleman who, having murdered another in a fit of jealousy, was condemned to suffer death. He was told that his life would be spared if he said that when he committed the deed he was intoxicated. He received the offer with disdain, and exclaimed: 'I would rather suffer a thousand deaths than bring eternal disgrace on my family by confessing the disgraceful crime of intoxication.' He was therefore executed.

COMPOSITION TESTS.—STANDARDS VI. AND VII.

Write at least 25 lines on *one* of the following:—

1. Some museum with which you are acquainted.
2. Various modes of travelling.
3. The best way of spending Christmas holidays.
4. A walk round a garden.
5. The advantages of a school library.
6. The contents of one of your reading books.

NEW READING TESTS.—STANDARD III.

Suitable for 'Unseen Tests' in Dictation also.

186.—A little boy about four years old had just been taught to do addition sums by counting on his fingers, but he had never had a sum in which the lines came to more than ten. One day he was set a harder sum than usual, and his teacher, seeing him crying, said: 'What is the matter, Bobby?' Bobby (sobbing): 'I haven't enough fingers, please, miss.'

187.—Elephants can be taught almost anything, from standing on a table and shaking hands, to uncorking a wine bottle and handing it to its owner. In the East they are regular workmen, and help to lay roads or build railways, obeying the word of command as obediently as the best of performing dogs could do.

188.—Copper has not been very long used in our country, though it has been known a great while as an ore. It is a

red metal, has a disagreeable smell, and is poisonous. It is good for sound. It makes fine trumpets, and is found in all church bells. It is much used in places where gunpowder is made. Strike a piece of copper against a piece of flint and you cannot get a spark.

189.—A naughty little boy was crying because his mother wouldn't let him go down to the river on the Sabbath, and upon being scolded said: 'I didn't want to go swimming with them, ma. I only wanted to go down and—and see the bad little boys get drowned for swimming on Sunday.'

190.—An important point in the structure of the camel is to be found in the formation of the eyes and nostrils, the former of which are provided with long lashes, while the latter can be closed at will, thus preventing the admission of grains of sand during the storms so common in the desert.

191.—Storks build their nests in airy spots, selecting the tops of trees, spires, and even chimneys. In Holland, boxes are sometimes erected for their special benefit, and a household that happens to receive a visit from this bird is supposed to be highly favoured. Before leaving their summer quarters they assemble in flocks, and make such a noise that they are supposed to be talking together.

192.—A doctor found one of his patients sitting in the bath and swallowing a dose of medicine. 'What are you doing there instead of being in bed?' inquired the astonished doctor. The patient quickly answered: 'You told me to take the medicine in water, and that's what I'm doing.'

193.—A cat had a kitten which, when it had learned to drink milk from the saucer with its mother, was given to a neighbour. For many days after the old cat never drank more than a certain quantity of the milk given to her, leaving the rest for her kitten which she hourly expected to return. After a time, finding that the kitten did not come, she resumed her habit of drinking the whole of the milk.

194.—The ostrich has been called a stupid bird, because at the near approach of danger it hides its head under its wing, as if it thought when its own eyes were shut no other eyes could see it. But no one who looked into its lovely eyes could believe this. It has also been said that the ostrich is a bad mother, laying her eggs in the sand, and leaving them to chance and sunshine, but this is false.

195.—Make a practice of regularly feeding your birds every morning, before you have your own breakfast. Be very careful in the cleaning out of the cage, and supply it with some nice dry sea-sand at least every third morning. Give them fresh seed and clean water at the same time. Nothing is more like to make a bird ill than water which has been left standing.—(H.M.I.'s Test.)

196. I hear thee speak of the better land,
Thou call'st its children a happy band;
Mother, oh! where is that radiant shore?
Shall we not seek it, and weep no more?
Eye hath not seen it, my gentle boy;
Ear hath not heard its deep songs of joy;
Dreams cannot picture a world so fair—
Sorrow and death may not enter there.

NEW DICTATION TESTS.—STANDARD IV.

Suitable for 'Unseen Tests' in Reading also.

No. 130.

In this and all countries of Europe, to turn the back upon persons of rank or in authority, is considered highly improper; a striking instance of which may be seen in the mode in which messengers from the Lords retreat along the floor of the House of Commons. In the interior of Africa it is quite otherwise; there the court assemble round the sovereign invariably with their backs to him.

No. 131.

The Brazil nut is a native only of South America, and is scarcely known outside the tropics of the New World. It grows in large forests, reaches a great height, and produces the nuts in a spherical shell about the size of an infant's head. They contain from fifteen to twenty-five nuts. So thick and hard is this outer shell that it is necessary to break it with a heavy axe before the nuts can be extracted.

No. 132.

Near Land's End there is a remarkable stone, which is a natural curiosity of a rare kind. Many years ago a lieutenant, who was in command of a gunboat cruising off the coast, in a foolish freak dislodged the rock, which, however, fortunately came to a standstill before it reached the sea. This deed excited great indignation, and the Admiralty insisted upon his replacing the stone at his own expense. This was done in due time, but the immense cost which was incurred ruined the unhappy man.

No. 133.

Emery was long regarded as a kind of iron ore. Its hardness is so great that it scratches and wears down nearly all minerals except the diamond. It is found in large blocks, which are broken up in the same manner as stone for roads. The lumps are then crushed under stampers, such as are used for pounding metallic ores. A coarse powder is thus obtained, which is sifted in sieves of wire according to the fineness required. Emery paper is prepared by brushing paper over with thin glue, and dusting the powder over it with sieves.

No. 134.

The Japanese are more highly civilised than is by many people supposed. It has been recently stated that if, in a Japanese city, one picks up a stone to throw at a dog, the dog does not run, because he has never had a stone thrown at him and does not know what the action means. Manifestly, if such a state of universal gentleness and kindness prevails in Japan, that not even a stone is thrown at a dog by a boy, the fact is to be taken as an excellent item of evidence in making out a case of high civilisation for the Japanese.

No. 135.

A great philosopher, a little before he died, said, 'I don't know what I may seem to the world, but, as to myself, I seem to have been only a boy playing on the sea shore, and diverting myself in now and then finding a smooth pebble, or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.'

No. 136.

One of the animals peculiar to Australia is known as the flying fox. It climbs trees and leaps like the squirrel, which it is enabled to do by means of a wide fold of skin stretching from its legs to its body. This gives the animal a certain amount of buoyancy in its flight. It is, however, not so intelligent as the squirrel. When pursued it soon gives in, hanging by its tail to a branch, where it is easily captured. They say the steady gaze of the hunter wearies the animal and bewilders it, so that it falls helpless to the ground.

No. 137.

The Norwegian forests, which are chiefly of pine brightened with birch, are full of the most beautiful of wild flowers. Many varieties which with us grow only when cultivated, such as the lily of the valley and sweet violets, grow wild in these Norwegian woods. Later there is a profusion of wild berries, and always a chorus of birds. Bathing is a little dangerous for any but good swimmers. The depth of the waters is great, and the descent of the shores abrupt. At times, too, there is in the water a sort of jelly-fish, which impregnates it with a poison as stinging to the skin as the nettle.

No. 138.

Few of the lonely isles of the great Antarctic Ocean are ever visited by human beings. To whalers and seal-hunters they offer at times a welcome harbour from the tempest's fury—for any shelter is better than none in a storm—but the rock-bound shores of most of them are inhospitable. Still, though man rarely seeks their refuge, such as it is, it must not be supposed that these islands are untenanted. On the contrary, they are resorted to by innumerable sea-birds for nesting purposes.

No. 139.

The Queen of Italy is the patron of a school of cooking, in which she is greatly interested. It is already self-supporting, as it sends out more than a hundred dinners every day. Each dinner is enclosed and kept hot in a specially-constructed tin box. Poor and rich are equal customers. The price at which a dinner is wanted, and the number of people who wish to dine, is stated in giving an order, and the cooks who direct the school send the best they can—under all circumstances an appetising and well-prepared meal.

No. 140.

In the neighbourhood of the Bermudas the sea is extremely transparent, so that the fishermen can readily see the horns of lobsters protruding from their hiding-places in the rocks at considerable depths. To entice them from these crannies they tie a number of snails in a ball and dangle them in front of the cautious lobster. When he seizes the ball they haul him up.—(H.M.I.'s Test.)

No. 141.

Our own little island encircled by sea
Of the heart of a Briton fit emblem may be;
On the ocean of life for the poor and distress'd,
His bosom affords a sure haven of rest:
The streams of soft pity and charity flow;
The tears of sweet sympathy mingle with woe.
'Tis the soul of delight dwells, dear England, in thee;
Oh! my own native land is the country for me!

STANDARDS V.—VII., AND 1ST AND 2ND YEAR P.T's.

No. 120.

A CURIOUS race was recently witnessed, the contest being between pigeons and a number of bees, the respective owners of which had wagered their favourites to win. The course was three miles and a half, and a dovecot which happened to be near a hive was selected as the winning post. It was found no easy matter to mark the bees so as to make their identity unmistakeable, but the difficulty was at last surmounted by rolling them in flour previous to starting them on their journey. This, while making them easily recognized on their arrival, probably retarded their flight; but nevertheless, and though the pigeons were looked upon by those interested as the most likely winners, the race resulted in a victory for the bees; the first bee arriving at the post twenty-five seconds before the first pigeon, and three other bees before the second.

No. 121.

THE Chinese and Japanese are peculiarly skilful at botanical feats. One of their wonderful achievements is known as the 'changeable rose.' This bloom is white in the shade, and red in the sunlight. After night or in a dark room this curiosity of the rose family is a pure, waxy white blossom. When transferred to the open air the transformation immediately steps in, the time of the entire change of the flower from white to the most sanguine of hues depending on the degree of sunlight and warmth. First the petals take on a kind of washed or faded blue colour, and rapidly change to a faint blush of pink. The pink gradually deepens in hue until you find that your lily-white rose of an hour before, is as red as the reddest peony that ever bloomed.

No. 122.

THE highest court of the United States holds a unique place in our form of government, and one not found in any other governmental system. It wields a power greater than is exercised by any other judicial tribunal in the world. In no country of Europe or the East has any court authority to make or unmake the supreme law of the land, to limit the prerogatives of the sovereign, to control the powers of the legislature, to shape the form of government. These functions are exercised by the supreme court of the United States. It holds a power above that of the chief magistrate of the nation, superior to that of congress, higher than that of any state, and equalled only by that which made or can amend the constitution. It can enlarge or limit the prerogatives of the president or the powers of congress.

No. 123.

AT the time when disunited Germany was making her last stand, funds were required to equip the army and put it on the field. From all ranks money came in, from the nobility down to the peasantry. Men of substance sold their houses and gave the proceeds to the cause, and every day appeals were published in the newspapers and gazettes, followed by lists of contributions from half a noble's fortune to a widow's mite. A man and wife, having nothing of value left but their wedding-rings, gave them away to the Fatherland. Their names were not published, but the simple-hearted devotion appealed so strongly to the women of Prussia that rings and trinkets poured in. A citizen of Berlin then hit upon the idea of giving iron 'Rings of Honour' in exchange for gold rings and other jewellery, and these rings are now amongst the most treasured heirlooms of those who possess them, reminding them, as they do, of the days when German women gave up their gold for iron, so that the jewels which adorned beauty at home might serve the nobler purpose of equipping valour in the field.

No. 124.

SICILY, that lovely island which is a natural paradise and has at times supported a large population in luxury, had been reduced to such a condition by brigandage at the time Victor Emmanuel ascended the throne that land could not be given away, and the old nobility which had enjoyed ample incomes for generations from their broad acres, were reduced to positive misery. The king employed one gang of brigands to hunt down another gang, and he made each locality responsible for depredations committed within its limits. The plague was thus extirpated.

No. 125.

WHEN a young man has made up his mind that he will get on in life, let him take due time to reflect on the best means of accomplishing his object, and having laid down such rules for his future conduct as his reason and his conscience approve, let him stick to them inflexibly. He must forego self-indulgence where it would be likely to interfere with his interests; select as his friends men who have the ability and the will to further his main design (and this requires judgment); and learn to work perseveringly towards his object without being discouraged by the rude jostlings that he is pretty sure to meet with on the road.

No. 126.

AT the time of her coronation, Catherine I., Empress of Russia, was presented with a watch. It weighed seven ounces and was both a repeater and a musical time-keeper. On the opposite side from the works or time-keeping part of the wonder, there was an exact counterpart of the holy sepulchre with a carved image of the Roman guard; this scene could be viewed through the glass in the case. Upon opening the case the imitation stones would roll away from the mouth of the miniature sepulchre, the guard would kneel, angels appear at opposite sides of the opening, and about this time the music would start up and play, in soft, sweet strains, the Easter songs so well known to all Russians. The maker of this wonderful piece of mechanism is said to have worked upon it almost uninterruptedly for a period of nine years.

No. 127.

THE ancient republic of San Marino, which, though the most insignificant State in Europe, is nevertheless the only one which has not suffered in the political storms which have convulsed all Europe, and of which the constitution and independence have always been recognised by its more powerful neighbours. It has now completed more than fifteen centuries of existence. It has an area of thirty-three square miles, and contains a town of the same name. It lies among the spurs of the Apennines. Agriculture and cattle breeding are the principal occupations of its peacefully disposed population. For the purposes of defence, the militia force numbers 950 men.

No. 128.

SELECT books that are informing, and so far as in your power equip yourselves with wide knowledge in all branches of history, literature, and affairs. Are you deficient in any of these? Then seek the best authorities, and bring yourself to the highest standard in that field without delay. Let your intellectual progress be marked with positive accumulations. When you read a book that is really worth the time you spend with it, do not cram your mind with others, but do a little earnest and profitable thinking before you take up its successor in your reading course. The perusal of a book gives birth to ideas in no way connected with the subject of which it treats. All careful readers should, however, avoid dwelling too long upon one line of study or thought. Light and varied reading should be interspersed with the solid and useful. An extreme in either direction is to be avoided.

No. 129.

THESE are Thy glorious works, Parent of Good!
Almighty! Thine this universal frame,
Thus wondrous fair; Thyself how wondrous then!
Unspeakable! Who sitt'st above these heavens,
To us invisible, or dimly seen
In these Thy lowest works; yet these declare
Thy goodness beyond thought, and power divine.
Speak, ye who best can tell, ye sons of light,
Angels! for ye behold Him, and, with songs
And choral symphonies, day without night,
Circle His throne rejoicing—ye in heaven;
On earth, join all ye creatures to extol
Him first, Him last, Him midst, and without end!

LONDON MATRICULATION.

PREPARATION CLASS FOR JANUARY, 1895.

BY R. C. B. KERIN, B.A. (LOND.),
First in First-Class Classical Honours at Final; Principal, Carlyon College, Chancery Lane, W.C.,

AND E. J. SCHWARTZ, B.A. (CAMB.),
Mathematical Scholar and Honourman in Tripos.

LATIN.

Before making my final remarks on the January Examination, I must offer all who have followed this course my best wishes for success in the coming examination. It will be advisable to work through the Vergil again before the examination, or if your time is too limited for that, at any rate work through those pieces which have presented most difficulty. I should suggest the following passages. In Book III., ll. 135–146, 191–204, 222–237, 297–312, 357–380, 410–425, 441–457, 530–550, 676–686. In Book V., 84–93, 124–147, 195–212, 249–262, 272–281, 323–339, 414–460, 560–603, 673–684, 816–832, 844–860.

The last time Vergil was set was in June 1892. That time two passages for translation were given, one from each book, fifteen or sixteen lines from each. Five questions were set on the author. Some of the uncommon words occurring in the books were given. There were nine or ten selected passages to comment on. There was a question on the geography and history occurring in the books. Metrical peculiarities also formed a question.

Amongst the uncommon words occurring in the 3rd and 5th books are:—*vitta, cymbia, cortina, cunabula, lues, glaeba, caligo, armenta, specula, funis, rudens, altrix, palaestra, gestamen, transtra, caespes, fastus, incassum, praepes, carbasus, ilex, barathrum, spelunca, pistrix, antrum, loricam, hamus, conus, subtemen, crater, amictus, antennae, favilla, camina, polus, sanies, lustra, stuppa, gaza, trudes, acerra, caestus, carchesia, gyros, squama, pruna, veru, apricus, sulcus, cuspis, taenia, pharetra, fibula, galea, nōtus, acta, abies, cuneus, cete, meta, clavus.*

The proper names that occur should be known, and students should practise drawing a map of the places passed by Aeneas.

Archaic forms like *aulai, olli,* are important.

Note contracted forms like *traxe,* and the declension of words like *Ino.* Note the Greek accusatives, which are very common, *e.g., cratera, Idomenea,* etc.

With regard to the *metre,* note that a 'hypermetric line' is one with a syllable too much, *e.g.*—

Et magnos membrorum artus magna ossa lacertosque.

An instance of *synizesis,* or scanning of two syllables as one, is found in—

Gĕnŭă lăbant vastos quatit aeger anhelitus.

An instance of Greek scansion, shortening of long vowel and hiatus, is—

Īnsŭlăe | Ionio in magno, quas dira Celaeno.

An instance of a spondaic line (one in which the last syllable but one is a *spondee*) is—

Armatumque auro circūmspĭcit | Ōrī|ona.

An instance of lengthening of a short vowel before caesura is—

Dona dehinc auro grăvi|ā sĕctoque elephanto.

An instance of the shortening of a vowel is—

Obstipui steterūntque comae, vox faucibus haesit.

Explanations may be required of the following:—*Nec cedit honori, scuta latentia condunt, Ledaeam Hermionem, Clarii laurus, praepetis omina pennae, multo suspensum numine ducit, volvit vices, comas adopertus amictu,* ll. 416–419, Book III., ll. 453–456, *sunt et sua dona parenti, sortiti remos, portus ab Euroo fluctu curvatus, cornua obvertimus antennarum, Phoebeae lampadis instar,* ll. 684–686, Book III., *fatis nunquam concessa moveri Camarina, reliquias immitis Achilli, ama litus, gratatur reduces, urbe Mycenae, ore favete, aevi maturus, pars et certare parati, voti reus, donat habere viro, exurere sterilis agros, consessu medium tulit exstructoque resedit, simul ultima signant, calcemque terit iam calce, transeat elapsus prior ambiguumque relinquat, tertia palma Diores, aemula temporibus geminis canebat sparsa senectus, nunc hos nunc illos aditus, omnemque pererrat locum, superans animis, pro se quisque viri, exsortem ducere honorem, praelato invidit honori, Troiaque nunc pueri Troianum dicitur agmen, implentur super puppes, fecere pedem, aequatae spirant aurae.*

Note that in the third and fifth books Vergil follows closely in the steps of Homer. Some events are taken from the Greek drama and from Apollonius.

A life of Vergil should be known. Note the different views held of the purpose of the Aeneid. It has been regarded as (*a*) the sequel and counterpart of the Iliad; (*b*) the glorification of Augustus as represented by Aeneas; (*c*) the celebration of the triumph of civilisation; (*d*) a patriotic and religious poem.

In the Grammar revise carefully my notes in the preceding numbers, and note the following on last month's course.

The definition of Oratio Obliqua is very important. Three changes occur in passing from Oratio Recta to Oratio Obliqua—(1) Mood; (2) Person; (3) Tense. The verb in the principal clause, as a rule, becomes the infinitive; the imperative, however, becomes the subjunctive, and questions are put in the subjunctive, if they are real questions and in the 2nd person. The verbs in the subordinate sentences are put into the subjunctive. The tenses of the subjunctive are usually secondary. The 1st and 2nd persons in Oratio Recta become the 3rd person in Oratio Obliqua.

The following passages of Oratio Recta and Oratio Obliqua are taken from an excellent elementary Latin Grammar by Professors J. Roby and A. S. Wilkins (Macmillan). Students will do well to go over these passages carefully.

Oratio Recta.—Si pacem populus Romanus cum Helvetius faciet in eam partem ibunt atque ibi erunt Helvetii ubi tu eos constitueris; sin bello persequi perseverabis, reminiscitor et veteris incommodi populi Romani. Quod improviso unum pagum adortus es ne ob eam rem aut tuae magnopere virtuti tribueris aut nos despexeris.

Quod si veteris contumeliae oblivisci volo num etiam recentium iniuriarum quod me invito iter per provinciam per vim temptastis quod Aeduos quod Ambarros, quoa Allobrogas vexastis memoriam deponere possum?

Oratio Obliqua.—Si pacem populus Romanus cum Helvetiis faceret in eam partem ituros atque ibi futuros Helvetios ubi eos constituisset; sin bello persequi perseveraret, reminisceretur et veteris incommodi populi Romani. Quod improviso unum pagum adortus esset, ne ob eam rem aut suae magnopere virtuti tribueret aut ipsos despiceret.

Quod si veteris contumeliae oblivisci vellet num etiam recentium iniuriarum quod eo invito iter per provinciam per vim temptassent quod Aeduos quod Ambarros quod Allobrogas vexassent, memoriam deponere posse?

One of the last things a student should do for January 14 is to revise the declensions of nouns, adjectives, and pronouns, the irregular verbs, the rules for gender, the numerals, and

the comparison of adjectives and adverbs. Three questions are generally set on these points.

Dates, too, are important.

Note the following typical cases :—

March 1	Kalendis Martiis	Kal. Mart.
March 3	Ante diem quintum Nonas Martias	a.d.v. Non. Mart.
March 7	Nonis Martiis...	Non. Mart.
March 10	Ante diem sextum Idus Martias	a.d.vi. Id. Mart.
March 14	Pridie Idus Martias	Prid. Id. Mart.
March 15	Idibus Martiis	Id. Mart.
March 23	Ante diem decimum Kalendas Apriles	a.d.x. Kal. Apr.
March 31	Pridie Kalendas Apriles ...	Prid. Kal. Apr.

Remember the rhyme for the date of the Nones and Ides :—

'In March, July, October, May,
The Nones are on the seventh day.'

The Ides are then on the 15th.

With regard to sesterces, note :—

1,000 sesterces = *mille sestertii.*

2,000 sesterces = *duo milia sestertium*, or *duo sestertia.*

1,000,000 sesterces = *decies* (*centum milia*) *sestertium.*

Note that the fractions of the *as* are used in 'expressing' the fraction of an inheritance, *e.g.*, 'heir to half the property,' *heres ex semisse;* 'heir to one-fourth,' *heres ex quadrante.*

Solution of Sentences.

(1) It is ninety years since he was king. He had reigned thirty years.

Abhinc nonaginta annos rex erat. Triginta annos regnaverat.

Notes. (*a*) *Ago* is expressed by *abhinc* and accusative. (*b*) 'Time how long' is expressed by accusative, hence *triginta annos.*

(2) 'He was so saddened by the death of his father that he could never go to Rome without shedding tears.'

Morte patris sui tam tristis factus est ut nunquam Romam ire posset quin fleret.

Notes. (*a*) *Morte*, abl. of the cause or instrument. Avoid using the preposition *a* or *ab* in such a case. (*b*) 'his' will be translated by *sui* and not by *eius*, because it refers to the subject of the sentence. (*c*) *tam* used with adjectives for 'so.' (*d*) 'So that never' is translated by *ut nunquam;* 'in order that never' by '*ne nunquam.*' The subjunctive is used after both. As *factus est* is in a secondary tense, the imperfect subjunctive is used. (*e*) '*to Rome*,' no preposition. (*f*) *without* translated after a negative clause by *quin* and the subjunctive. Avoid using *sine* and *gerund.*

(3) If I had asked you to do this, I should not have been prevented from going away.

Si te rogavissem ut hoc faceres, non prohibitus essem quominus abirem.

Notes. (*a*) The subjunctive will be used after *si*, because the subjunctive is used in the principal clause to translate 'would have.' (*b*) 'to do this' must not be translated by the infinitive, as after verbs of asking, begging, etc., 'to and the infinitive' are rendered into Latin by *ut* and the subjunctive. The tense of the subjunctive *faceres* is determined by the rule of the sequence of tenses. (*c*) 'from' and the verbal noun are translated in Latin by *quominus* and the subjunctive after verbs of preventing.

(4) Who could have doubted that it was all over with the army ?

Quis dubitare potuit quin de exercitu actum esset ?

Notes. (*a*) Avoid translating the interrogative *who* by *qui.* (*b*) Many will fall into the mistake of translating 'could have hesitated' by *dubitavisse potuit.* Remember that *debeo, oportet*, and *possum* are not followed by the perfect infinitive. In English we use the past infinitive to denote past tense with the verbs 'could,' 'ought,' etc., but no other language has that idiom. (*c*) *Quin* is used to translate 'that' after negative or virtually negative verbs of doubting. Here *quis dubitare potuit* expects the answer '*no*,' hence it is virtually negative. (*d*) Note the phrase '*actum est de*,' 'it is all over with.'

(5) There are some who are afraid to die for their native land ; many would rather die than live without honour.

Sunt qui pro patria mori timeant; multi mori quam sine honore malunt vivere.

Notes. (*a*) When the relative *qui* has an indefinite antecedent the subjunctive is used, hence *timeant.* (*b*) 'would rather' = 'prefer' = *malo.*

(6) The first thing to be demanded of an orator is that he should speak well.

Primum ab oratore postulandum est ut bene loquatur.

Notes. (*a*) Avoid writing *primum postulari* or *primum est postulari. Primum* will be used like *primus* in *primus hoc fecit*, 'he was the first to do this.' (*b*) Don't translate the 'of' by the genitive. (*c*) The 'that clause' will be expressed by *ut* and the subjunctive.

(7) Phocion supported his friend, although he might have abandoned him with impunity.

Phocion cum impune deserere posset amico suo subvenit.

Notes. (*a*) The verb *adsum* is followed by the dative. The verb *subvenio* also takes dative. The verb *adiuvo* would require the accusative. (*b*) If *eius* were used instead of *suo*, the 'his' would not refer to Phocion, but to someone else. (*c*) 'might have,' *potuit* with present infinitive, *not* with perfect infinitive. See example above, *dubitare potuit.*

(8) He stopped in the city of Rome till the Senate broke up.

In urbe Roma mansit dum senatus dimitteretur (*dimissus est.*)

Notes. (*a*) In Rome would be translated by *Romae.* When the word 'city' is used the word 'Rome' will be put in apposition with *urbe.* (*b*) The subjunctive is used after *dum, donec*, when there is an idea of purpose or result. Here 'until' could mean 'so that meanwhile,' and in that case the subjunctive *dimitteretur* will be used. If, however, 'until' is used in a strictly temporal sense, the indicative *dimissus est* will be used.

(9) Hearing that Pompeius was ten miles away from Rome, he wheeled round his forces and charged the enemy, who were off their guard.

Cum Pompeium decem milia passuum a Roma abesse audiisset signis conversis in hostem incautum impetum fecit.

Notes. (*a*) 'Hearing' is not to be translated by *audiens*, as the pres. participle cannot be used in Latin except when it denotes the same time as that of the verb to which it is attached. If the verb *audio* had a perfect active participle, it would be used ; as it has not, use *cum* with pluperfect subjunctive. (*b*) The 'that clause' will be translated by acc. and infinitive after the verb of hearing. Use the present inf. *abesse*, as the time of it is the same as that of the verb on which it depends. See former months for other instances. (*c*) *from* will be translated here by '*a*,' as *space from* is denoted, not *motion from.* (*d*) *conversis signis*, lit. 'the standards having been turned round.' The abl. absolute and a finite verb often supply the places of two finite co-ordinate verbs in English.

French.

Now that the time of trial is so near at hand, candidates will do well to devote special attention to the following parts of the grammar:—Formation of the plural and feminine; words (*a*) with no plural, (*b*) with no singular ; compound nouns ; position of the adjective ; meaning of adjectives according to position ; formation of adverbs from adjectives ; nouns that differ according to their gender ; numerals, dates, etc. ; usages of *demi, nu, tous, gens, feu ;* uses of the pronouns, *dont, en, y*, etc. ; irregular verbs ; methods of forming interrogative and interrogative-negative sentences ; reflexive verbs ; methods of comparison ; rules for the agreement of the present and past participles.

Above all you must know your verbs thoroughly. They are a *sine quâ non. S'en aller* is a favourite verb in the matriculation. If a sentence is given to you to turn into the plural, be careful about the agreement of the past participle if there is one.

A question like this has been set. Express the italicised words in the following sentences as participles. (*a*) Ils ont été *battre ;* (*b*) nous avons *courir* et nous sommes *arriver* a temps. A question like this is set to test your knowledge of

past participles. In (*a*) *battre* will become *battus*, agreeing with *ils*. In (*b*) *courir* will become *couru*, no agreement, and *arriver* will become *arrivés*. In the first case *courir* is an intransitive verb, conjugated with *avoir*; in the second case *arriver* is one of the neuter verbs conjugated with *être* that agree with the subject.

English.

Skeat in his Primer of English Etymology divides English into three periods—(*a*) Old English, 450–1200; (*b*) Middle English, 1200–1500; (*c*) Modern English, 1500 on. In Old English three main dialects are found—(*a*) Northumbrian, (*b*) Mercian, (*c*) Wessex, or Anglo-Saxon. We have scarcely any remnants of the Northumbrian and Mercian dialects, and as English is a descendant of the Mercian dialect, this is a great disadvantage to us in tracing the history of words. After the Norman Conquest, we still find three leading dialects—the Northern, Midland, and Southern. The Northern dialect was spoken north of the Humber, and was, owing to various causes, especially to the Danish invasion, less inflexional than the other two dialects. Lowland Scotch, the Yorkshire and Lancashire dialects, are its modern representatives. The Midland dialect asserted its predominance in the Middle English period, and is the parent of Modern English. Its supremacy was due, among other causes, to:—(*a*) It was understood by the Northerner and Southerner, it was less inflexional than the latter, and more inflexional than the former; (*b*) it was the dialect spoken by London, Oxford, and Cambridge; (*c*) it was the dialect used by Chaucer. The Southern dialect was, on account of its complexity and peculiarities of pronunciation, less fit for general use. The Somerset and Dorset dialects, etc., are descendants of the Southern dialect. William Barnes' poems are a good example of the dialect.

Greek.

Candidates should again go carefully over the Iliad, and parse the difficult verbs. Something of the history of the Iliad and the various theories as to its composition should be known. The differences between Homeric accidence and syntax and Attic accidence and syntax should be known. Instances of the traces of the digamma found in Homer are important. In Grammar, revise the accidence and syntax.

MATHEMATICS.

Course for January.

This being the last course which will appear in this paper before the commencement of the examination, we will devote a few lines to some general advice to the intending candidate.

In the first place, the short though valuable time still left to him before the 'dreaded day' should be entirely devoted to a careful revision of his work, more especially those portions of it in which he feels himself to be weak. For example, a candidate should possess such a thorough knowledge of the propositions of Euclid as to be able without fail to start his Euclid paper by writing out correctly and neatly any bookwork which the examiners may require of him. In our opinion there is but little excuse for the student who is not equipped with such a knowledge by the examination day.

A word to those who are weak in Mathematics. Let them pay the most scrupulous attention to the neatness and accuracy of their work; let them avoid, as far as they are able to do so, sending up any answers which show an entire ignorance of the principles of the subject on which they are writing, such solutions as are the outcome of pure and ignorant guesswork on the part of their authors.

It is no exaggeration to say that many a candidate owes a failure in Mathematics entirely to his own carelessness; he comes out of the examination room and finds that he has lost many marks (which he can ill afford to lose) by making merely numerical mistakes in several questions for which otherwise his solutions would have obtained full marks; this is easily to be avoided by a careful revision of his work; each sum, the method of working which the candidate knows to be correct, should be worked through a second time before going on to another question, and if possible by a slightly different method, and it should be again revised before leaving the examination room.

There should be but little need to impress on a weak mathematician that one of his chances of success lies in neat and well-written work; this, supplemented by accuracy, will go a long way to ensure success.

The past lessons in this paper should be revised, and the worked-out examples which have from time to time appeared should be carefully studied.

I will close these few remarks by wishing good-luck and success to my readers.

Arithmetic Course for January.

The bookwork should be carefully revised, including proofs of such facts as—

$$\tfrac{3}{4} = \tfrac{6}{8};$$
$$\tfrac{3}{4} \text{ of } \tfrac{5}{7} = \tfrac{15}{28};$$
$$\tfrac{3}{4} \div \tfrac{5}{7} = \tfrac{21}{20}.$$

Decimals should be carefully revised; how to bring recurring decimals to vulgar fractions; how to add recurring decimals without bringing to vulgar fractions; the approximate methods of multiplication, division, and square root; interest, percentages, and stocks should have a short revision. It should be added that the tables of weights and measures (English and French) may need a short revision.

Be able to explain why the recurring decimal representing $\frac{1}{7}$ consists of the same digits as that equivalent to $\frac{2}{7}$, $\frac{3}{7}$, $\frac{4}{7}$, $\frac{5}{7}$, or $\frac{6}{7}$. Is a similar proposition true for $\frac{1}{17}$?

We append a few examples:—

(1) To reduce $\frac{19}{20}$ to a recurring decimal.

19)10·0(·5
95
5

We know that $\frac{5}{100} = \frac{1}{2}$ of $\frac{19}{20}$ (1).

Now first figure of $\frac{19}{20} = \cdot 5$;

$\therefore$ first figure of $\frac{5}{100} = \cdot 2$.

From the working above we see that the remaining figures of $\frac{19}{20}$ are the figures of $\frac{5}{100}$ (= ·2.....).

$\therefore$ second figure of $\frac{19}{20}$ is 2;

$\therefore$ first two figures of $\frac{19}{20}$ are ·52;

$\therefore$ first two figures of $\frac{5}{100}$ are ·26 by (1);

$\therefore$ third figure of $\frac{19}{20}$ is 6;

$\therefore$ first three figures are ·526;

$\therefore$ first three figures of $\frac{5}{100}$ are ·263;

$\therefore$ fourth figure of $\frac{19}{20}$ is 3;

$\therefore \frac{19}{20} = \cdot 5263$.

Proceeding thus, $\frac{19}{20} = \cdot 5263157894736842\dot{1}0$.

(2) Reduce 5938 feet to miles, etc.

3)5938 feet
1979 yards 1 foot
2
11)3958 half-yards
43) 359 poles 9 half-yards = 4 yards 1 foot 6 inches
8) 8 furlongs 39 poles
1 mile.

1 mile 39 poles 4 yards 2 feet 6 inches.

Algebra Course for January.

The bookwork should be carefully revised, not forgetting the proofs of such fundamental theorems as—

$$a \times b = b \times a,$$
$$a - (b - c) = a - b + c,$$
$$a(b + c) = ab + ac.$$

The formulæ dealing with factors, and those dealing with the progressions, should be known by heart; the bookwork on the progressions must also be so learnt as to be capable of reproduction, as also the proof of rule for H.C.F.

Below are a few examples:—

(1) Prove that the product of any four consecutive integers increased by unity is a perfect square. (January 1894.)

Let m, $m + 1$, $m + 2$, $m + 3$, be four consecutive integers.

Then $m(m + 1)(m + 2)(m + 3) + 1$
$= m^4 + 6m^3 + 11m^2 + 6m + 1$
$= (m^2 + 3m + 1)^2$.

Our Science Section.

CHEMISTRY NOTES.

BY W. TATE, A.R.C.S., F.C.S.

GENERAL NOTES.—The barium salt of hydrazoic acid is obtained in beautiful crystals by the addition of an equivalent weight of barium hydrate to a solution of the ammonium salt, and evaporating the solution to dryness in the cold under reduced pressure,

$$2(NH_4)N_3 + Ba(OH)_2 = Ba(N_3)_2 + 2NH_4OH.$$

A method of manufacturing sodium hydrate has recently been perfected by Mr. Castner, in which electrolysis of a solution of common salt is employed for the simultaneous production of sodium hydrate and chlorine. The electrolytic cell is divided into three compartments, the two outer divisions contain carbon anodes, the central division receives the iron cathode. A cell 6 ft. long, 3 ft. wide, and 6 in. deep, will produce 34·5 lbs. of chlorine and 38·5 lbs. of caustic soda per day from 56·5 lbs. of salt, using the current obtained by 3·5 I.H.P. The sodium hydrate and chlorine are both of very good quality, the soda being said to grade 99·5 per cent. of actual hydrate.

Nature of Nov. 1st contains a note on the production of phosphoretted hydrogen by the direct union of its elements. Pure dry hydrogen is passed over the heated red modification of phosphorus (this form is used in order to be able to reach the temperature necessary before combination will take place), and the gaseous PH_3 is obtained contaminated with a little of the solid and liquid hydrides. M. Moissan has succeeded in reducing many of the most refractory oxides by heating them to a very high temperature with carbon in his powerful electric furnace. His most recent work is concerned with aluminium oxide. From crystallized corundum, metallic aluminium and a little aluminium carbide have been obtained by this process, though at the highest temperatures otherwise obtainable no such reduction takes place.

PRACTICAL NOTES.—A very one-sided view of analytical chemistry is imparted to a large number of students trained in accordance with the syllabuses of the Examining Bodies of this country. Too close an adherence to the particular reactions required to be used in connection with any special method of separation cannot fail to give narrow and inaccurate knowledge of the properties of chemical substances with which analysis is concerned. This narrowing tendency may be avoided by the earnest student without any great sacrifice of the time which may be at his disposal, and with very distinct gain in thoroughness, by attention to the following hints. We suppose the student to have passed through a preliminary course of experiments and to have attained some knowledge of the manipulation of apparatus and reagents.

Considering the properties of metals useful from the point of view of the analyst, we note that the type of reaction most used is that type in which a compound is separated from its solution on account of its insolubility in the substances present.

Solubility of various compounds is then one of the main properties to be studied by the analyst. Among the ordinarily used reagents we find that hydrochloric acid serves to precipitate the metals Pb, Ag, and Hg (from mercurous compounds) in the form of insoluble chlorides. AgCl and Hg_2Cl_2 are really insoluble and may be completely separated by filtration, but we find experimentally that $PbCl_2$ is by no means insoluble, in fact it is readily soluble in *hot* water, and is only partially separated on strongly cooling the solution. With ordinarily diluted acid we need not fear the precipitation of other metallic chlorides, but with concentrated hydrochloric acid we find that such is no longer the case. An excess of concentrated hydrochloric acid will precipitate from their solutions many salts ordinarily viewed as soluble; for instance, sodium chloride is so insoluble in a concentrated solution of hydrochloric acid that we may prepare pure sodium chloride by simply saturating brine with hydrogen chloride, when the salt is readily thrown out of solution. Again, we test for the presence of sulphuric acid by adding a solution of barium chloride in order to throw down the insoluble sulphate, but this test fails if we attempt to apply it to a *concentrated* solution of hydrochloric acid, for, in this case, a precipitate is produced by the barium chloride being itself thrown down, as it is but little soluble in concentrated hydrochloric acid. It is, therefore, necessary to dilute the concentrated acid, and we may then examine for the suspected impurity (sulphuric acid) in the usual way by the addition of barium chloride solution.

Next in order among the usual reagents is sulphuretted hydrogen. Nothing is more common than to find that it is perfectly well known that the metals of Group II. are precipitated from dilute acid solutions by this reagent, and yet many appear to be unaware that the metals of Group I. also give sulphides when hydrogen sulphide is passed through acid solutions of their salts. Again, antimony and tin sulphides are soluble in hot concentrated hydrochloric acid, and hence can only be precipitated by hydrogen sulphide when the solution is diluted. Similarly the yellow cadmium sulphide can only be precipitated from slightly acid solutions, and these solutions must be cold, as cadmium sulphide is soluble in hot dilute acids. With reactions of this kind we find then that with more acid present the sulphide is dissolved and H_2S liberated; with less acid and more H_2S present the sulphide is precipitated and acid is set free. The reactions are *reversible* and may be written as follows:—$2\,SbCl_3 + 3\,H_2S \rightleftarrows Sb_2S_3 + 6\,HCl$, in order to indicate that they proceed either way.

REFERENCES.—*The Journal of the Chemical Society*, 1894:—

July: 'The Structure and Chemistry of the Cyanogen Flame,' pp. 603—610 (Arthur Smithells and Frankland Dent). See also Newth's 'Inorganic Chemistry,' pp. 294—306. 'Observations on the Nature of Phosphorescence,' pp. 734—744 (Herbert Jackson).

August: 'The Chemical Relations of Carbon and Iron,' pp. 788—801 (J. O. Arnold and A. A. Read).

Read also a note on 'A Chemical Method of Isolating Fluorine,' *Nature*, p. 183; June 21, 1894.

NOTES ON QUESTIONS.—*Adv.* (6) For composition of air by weight, give Dumas' method of igniting Cu in air as described in Newth's 'Inorganic Chemistry' (p. 229). Air is a mixture, as shown by:—

(*a*) The production of atmospheric air on mixing 20·96 vols. of oxygen with 79·04 vols. of nitrogen, without any apparent chemical action. There is no change of volume or development of heat. Again, Gay-Lussac's Law of Volumes would find an exception in the case of air if it were included among compounds, and the proportions by weight of the two gases in air are not those of their combining weights nor of any simple multiple of the latter.

(*b*) The fact that the physical properties of air have the mean values of the corresponding properties of the two gases, *e.g.*, the refractive index of air is a mean between the indices for nitrogen and oxygen, whereas compound gases do not give mean values.

(*c*) The concentration of oxygen in the air by allowing diffusion to take place through a porous partition, such as the walls of a clay pipe; the remaining gas contains a larger proportion of oxygen than ordinary air. This could not have occurred if the air were a compound, for it would then diffuse by molecules which would each have the same composition as the mass of the air, and the residual gas would be of the same proportional composition as the air.

(*d*) The similar concentration of oxygen in the gases dissolved by water from the atmosphere; the gases expelled from water saturated with air contain nearly 35 per cent. of oxygen instead of 20·96 per cent. With a knowledge of the solubility of oxygen and nitrogen respectively in water, we can calculate from the known composition of the air the proportions in which each of these gases will be found after solution and expulsion from water, supposing nitrogen and oxygen to be mixed in the air. The calculated composition agrees with that experimentally determined.

Adv. (7), (*a*). See Newth (p. 271). (*b*) To prove that sulphuretted hydrogen contains its own volume of hydrogen, pass a current of the pure dry gas for a considerable time through a glass tube containing tin-foil, and contracted at each end. When the air is entirely displaced, as shown by the complete absorption of the passing gas in soda solution, seal the tube at the contractions by means of a blowpipe. On now heating the tube, the tin forms a sulphide with the sulphur, liberating the hydrogen. After cooling to the original temperature, the tube must be opened by filing off one end under water; no water enters the tube, and no bubbles of gas come off, hence the volume of gas is the same as when sealed. On opening the other end of the tube and lowering the latter in the water, the contained gas is expelled from the upper opening; it is shown not to be hydrogen sulphide by testing with lead acetate paper, when

no blackening occurs; on then igniting the issuing gas it burns with the characteristic hydrogen flame. *Adv.* (8). For O_2, P_4, Hg, and Cd, sufficient reason would be shown for the formulæ adopted if the latter were deduced from the respective relative densities of their vapours (or gas in the case of oxogen), the method of determining the density being briefly indicated in each case. The case (or at least *a* case, as there are other proofs extant) for the formula of ozone depends on an indirect method of determining its relative density, as this cannot be ascertained directly owing to the impossibility of preparing ozone free from oxygen. Soret proved that the ozone from a mixture of oxygen and ozone diffused through a small aperture at a certain rate. With the same apparatus he determined the rates at which carbon dioxide and chlorine respectively diffused through the same aperture when they were mixed with the same proportion of oxygen in each case. From the rate of diffusion of the ozone thus obtained, as compared with the rates of diffusion of carbon dioxide and chlorine, the ratio of the densities of the three gases is at once obtained by squaring the numbers giving the ratio of the diffusion rates and reading them inversely; for the rate of diffusion is inversely as the square root of the density. The ratios of the densities of carbon dioxide, ozone, and chlorine, were thus found (approximately, because the experimental errors were somewhat large). The density of ozone lay between that of carbon dioxide and that of chlorine, but much nearer the former. The only formulæ corresponding with densities between 22(CO_2) and 35·5(Cl_2) are O_3, with density 24, and O_4 with density 32. Of these, O_3 fulfils the condition of corresponding with a density nearer to that of CO_2 than to that of Cl_2, and hence we assign the formula O_3 to the substance ozone. It is tacitly assumed in each case that the formula for hydrogen would be correctly written as H_2. *Adv.* (9), (*d*). Note circumstances under which iron carbonyl is produced (Newth, p. 264). *Adv. Pract.* (3) and (4). Ammonium chloride prevents the precipitation of Zn, Mn, Ni, Co, Ba, Sr, Ca, and Mg by ammonium hydrate, and similarly prevents Mg being precipitated by ammonium carbonate by the formation of double salts of the type $MgCl_2$, 2 AmCl, which do not react with the reagents in question. *Hon.* (6). Note the explanation of the cementation process by assuming the formation of iron carbonyl, the penetration of this compound in the gaseous form into the red-hot iron, and its decomposition in the interior of the latter into carbon, iron, and carbon-dioxide, this carbon-dioxide forming the blisters on the surface of the bars. *Hon.* (8). The gas-volumeter and its uses will be described in a subsequent issue.

Exercises.

Advanced Stage. — (10) You are supplied with 500 grams of washing soda crystals, with the object of making caustic soda therefrom. How would you proceed, and what weight of product would you expect to get? (1894, S. & A. D.) (11) Describe the production of potassium dichromate on the large scale, and explain the reactions involved in the process.

Advanced Practical.—(5) How would you proceed in order to detect with certainty a small proportion of sodium chloride in a mixture consisting mainly of sodium bromide and sodium iodide? (6) What are the common impurities in commercial oil of vitriol and hydrochloric acid, and how would you examine these substances for the impurities you mention?

Honours.—(9) What is meant by a reversible reaction, and how are such reactions connected with the laws of mass-action? (10) How may a solution of sodium thiosulphate be standardized by (*a*) pure copper, (*b*) pure potassium permanganate, (*c*) iodine?

HONOURS PHYSIOGRAPHY NOTES.

BY R. A. GREGORY, F.R.A.S.,

Oxford University Extension Lecturer, Author of 'Elementary Physiography,' &c.,

AND A. M. DAVIES. B.SC. (LOND.), F.G.S.,

Late Demonstrator in Geology at the Royal College of Science.

Lakes formed by Earth Movements.

Some recent criticisms by Prof. Bonney on the theory of lake-production by the scooping action of glaciers have been summarized in 'Honours Physiography' (p. 139). The alternative theory being, at least in the case of the Alpine lakes, that they are the results of the latest of the earth movements that gave rise to the Alpine chain, it will be of use to summarise the knowledge that has accumulated during late years on certain lake-systems that have undoubtedly been produced through movements of the earth's crust. Three of the greatest systems of lakes afford us examples of three different ways in which this may take place: these are the lakes of the Aralo-Caspian system, those of Eastern Africa, and those of the Great Basin of Utah.

The Aralo-Caspian System.

This includes the Caspian and Aral Seas, with a number of minor Asiatic lakes extending probably as far as Lakes Balkash and Baikal. The Black Sea is a peculiar member of the system, to be referred to later.

The level of the Caspian is some 80 feet below that of the Black Sea, from which it is separated in part by the lofty range of the Caucasus. But to the north of this range the ground is so low that one of the tributaries of the Don, the Mauytsch, rises close to the Caspian, and only slightly above sea-level; and it is stated that a rise of only 23 feet in the level of the Sea of Azoff would be sufficient to bring about a connection with the Caspian. To maintain this connection, of course, the waters of the latter would have to rise more than 100 feet above their existing level, and in doing so they would flood all the land (actually below sea-level) for 200 miles to the north, and go some way towards establishing a connection with the Sea of Aral. A rise of another 100 feet would not only unite the Caspian and Aral, but make them overflow by the Tobol into the Arctic Ocean.

Since the movements that gave rise to the Alps, the Caucasus, the mountains extending thence away to the Himalayas, took place in late geological times, it is easy to see how these lakes may be the remnants of an extensive sea once stretching from the Mediterranean to the Arctic Ocean, and, perhaps, into the heart of Asia as well. This idea is confirmed by the relics of old lakes in the form of salt-deposits to be found in the low-grounds bounding the Caspian; and by the remarkable nature of the fauna of that lake itself. It includes such marine forms as seals (which must have come from the north, not from the Mediterranean), herrings, cockles, and other marine Lamellibranchs, and some Foraminifera. Along with these are fresh-water worms, sponges, and mollusca. The water of the Caspian is actually brackish, being much more decidedly so in the southern parts than near the mouths of the great rivers Volga and Ural. It may seem strange that a lake separated from the sea, and with no outlet for its waters, should be less salt than the sea, but the explanation is to be found in the low-lying shores which afford natural salt-pans where the excess of salt is crystallized out without the necessity for the concentration of the waters of the whole lake.

It is probable that the breaking-up of this great inland sea into isolated lakes was more extensive once than it is now, and that the sea has reconquered a great deal of space. The irregular outline of the Mediterranean shows how it may easily have once been a series of separate basins, and there is geological evidence that such was the case. Without going into this we may consider the case of the Black Sea, which appears to be an inland sea like the Caspian that has taken on a secondary communication with the Mediterranean. A late distinguished Austrian geologist, Neumayr, showed from the structure of Greece and Asia Minor that their mountain-ranges must in Pliocene time have been connected by a chain, whose sunken summits now form the Archipelago of the Ægean Sea—a region still noted for earthquakes. It was only when this chain was depressed that the Mediterranean waters could have gained access to the Black Sea. Neumayr's conclusions have recently received abundant confirmation from the sounding and dredging operations carried on in the Black Sea by the Russian Government. That sea is very barren of living animals, as compared with the Mediterranean, only surface (pelagic) forms being abundant, and bottom-living forms being confined within the 100-fathom line round the coast. But from greater depths the dredge has brought up remains of species no longer living in the Black Sea, but abundant in the Caspian. These forms adapted to brackish water were killed off wholesale when the salt waters of the Mediterranean gained access to the Black Sea; and it is considered that from the decomposition of so much animal and vegetable matter arose in the first place the sulphuretted hydrogen which forms an important constituent of the waters in the deeper parts of the Black Sea. The shallowness of the Bosphorus preventing the immigration of deep-water species from the Mediterranean, and the Caspian forms having been killed off, the barren condition of the Black Sea has resulted.

The African Lakes.

The African lakes also appear to have originated through earth-movements, though in a different way from the Caspian series. They are still very imperfectly known, and no complete history of them can yet be given. They have recently been studied by Dr. J. W. Gregory, who has explored the least known part of the African lake-district. He points out that they fall into two categories—those with rounded outline and low-shelving shores, like the Victoria Nyanza; and those which are long and narrow, with abrupt rocky shores, like Tanganyika.

The latter series, he points out, run along two well-marked lines, diverging from Nyassa, and curving round the Victoria Nyanza; then re-uniting at Lake Rudolf, into a single line which runs forward towards the southern end of the Red Sea. These lines mark the course of a long, narrow, abrupt-sided valley, which finds its continuation in the Red Sea itself, and afterwards in the Dead Sea and Jordan Valley. The whole of this line, whether occupied actually by water or not, consists of a narrow strip of sunken ground, bounded on either side by cliffs which are in places so steep that 'the most expert cragsman could not scale them'; and Dr. Gregory regards it as a long 'rift-valley,' formed by the trough faulting of the crest of a great anticlinal earth-fold. As is the case with similar depressed blocks known to geologists, volcanoes, mostly extinct, abound along its course, and the region is still liable to earthquakes. The distribution of the lakes along the part of the rift-valley which he visited has been shown by Dr. Gregory to be due to minor folds, either crossing the main one, or forming secondary rift-valleys within it.

Dr. Gregory's discoveries cannot, however, exhaust the history of these remarkable lakes. Tanganyika is a fresh-water lake, 2,700 feet above sea-level, but it contains a very peculiar fauna, in which, along with many fresh-water forms are found some gastropods of decidedly marine affinities, and a jelly-fish (*Limnocnida*). This seems to show that the sea must have had access to the 'rift-valley' since its formation, and that the whole district has undergone marked elevation since then, probably in continuation of the anticlinal folding that preceded the formation of the 'rift-valley'; for the African lakes now lie practically on the watershed of Africa, and discharge their waters either into the Atlantic, the Mediterranean, or the Indian Ocean.

The Lakes of the Great Basin of Utah.

These lakes, of which the Great Salt Lake is the largest, illustrate a third type. They differ from the African lakes in having no outlet for their waters, while, unlike the Caspian, they are not detached portions of the sea. Their water is very salt (affording an excellent illustration of the growth of salinity by mere concentration), and they support a meagre fauna of brine-shrimps and insect-larvæ. The district being an arid and rainless one, the great earth-movements connected with the formation of the lakes have left indications at the surface which in countries like our own would be at once obliterated by erosion, and so American geologists have been enabled to work out a very complete history of the district. They have shown that the movements of upheaval of the Wasatch Mountains led to the formation of a basin in which several fresh-water lakes, the largest of which (named Lake Bonneville) was about as large as the Victoria Nyanza: the Great Salt Lake is the shrunken remnant of it. At this time, the overflow from these lakes still drained into the Pacific, and they supported an abundant fresh-water fauna. Partly by the excess of evaporation over rainfall, and partly by the continued earth-movements, the lakes shrank in size and lost their outlet, which can still be seen high and dry, far above the modern lake. In addition, a series of old beaches, indicating successive stages in the shrinking, can be seen on the hill-sides, and form the most striking features in photographs of the district. The continuation of earth-movements to recent times is clearly shown by the tilting and faulting of these beach-lines; and some of the fault-planes are so sharp that Mr. G. K. Gilbert remarks that 'it is hard to believe their antiquity is measured by centuries rather than decades. . . . We are here brought face to face with a process of mountain-making in actual progress. The Wasatch has grown perceptibly within a few years.'

Note on the Formation of Deltas.

The formation of a delta is generally ascribed simply to the checking of rapidity of flow of a river when it enters a sea free from powerful currents. This is not sufficient explanation, for the mixture of salt with the fresh water might be expected to have some influence on the suspension of sediment. The first idea that suggests itself is that the greater density of salt water would cause the buoying-up of sediment and so prevent its rapid deposition. But actual experiment shows that fine material settles more rapidly in salt water than in fresh. The explanation is to be found in the diminished adhesion of slightly salt water to solid particles, that more than balances the buoying effect of its greater density.

Explorations of the Upper Air.

A paper by Prof. Mark W. Harrington, Chief of the U.S. Weather Bureau, on the methods employed in the systematic exploration of the upper atmosphere, appears in *Aeronautics*. (See also 'Honours Physiography,' p. 81.) The following extracts from it brings together a number of points of importance to physiography students:—

The exploration of the upper air is the immediate requirement for the satisfactory advance of meteorology. There is abundant reason to think that many of the changes which go under the name of weather have their origin at some distance above the earth; and of what occurs in the cloud layer or layers our knowledge is insignificant or theoretical. The only systematic attempt to investigate the higher atmosphere has been by means of mountain stations; but this, though it has led to a series of interesting results, does not meet the requirements of the meteorologist. The station on the mountain-top is, after all, only a station on the earth's surface; and though many of the equidynamical surfaces show change with the elevation of the land (the isobaric, for instance), others (as the isothermic and those for wind and humidity) show marked adaptation to the contour of the surface. Many aeronauts have noted this adaptation as especially true of the cloud layers, the lower one often reproducing with some exactness the general variation of the surface below. It can hardly be expected, therefore, that the mountain stations, useful as they are, will give the aid needed in ascertaining what goes on at considerable elevations in the free air.

There are several ways of exploring the upper air by investigating the ray of light which has passed through it. The spectroscope promises much in this direction. The twinkling of the stars might be expected to give us a great deal of information when properly interpreted; and Sr. Ventosa has shown that even the fluctuations on the margins of the larger celestial bodies, when viewed in the telescope, have apparent relations with the upper winds.

It may be mentioned as of interest in this connection that the scintillation of stars has been especially and systematically studied; and M. Dufour, one of the leading students of the subject, has recently announced ('Archives des Sciences Phys. et Nat.,' June, 1893) that the only meteorological result he has been able to reach is the rule that lessenened twinkling indicates bad weather.

There remain as means of systematic exploration of the free air, elevated towers, kites, pilot balloons (without aeronauts), and balloons carrying aeronauts. The elevated towers are well illustrated by the Eiffel Tower in Paris. By such a tower a systematic study may be made of a layer of air 1,000 ft. thick, with almost infinitesimal perturbations by the tower itself. The excellent series of observations made by the French National Service on the Eiffel Tower have proved of very great interest, yet they do not reach to the height needed for the study of the upper air. It tells nothing of what happens in the cloud layer, probably the most important of the strata of the atmosphere. Moreover, such towers are very expensive to build and to maintain.

The method by kites has been studied especially by Mr. W. A. Eddy, who uses tailless kites, placing them in tandem. By such means he has attained heights of five thousand feet, and confidently expects to attain fourteen thousand feet without serious difficulty.

The best possible anemometer is a balloon which is immersed in the air and moves freely with it. For half a century or more occasional studies of the lower air currents have been made by means of small pilot balloons. The balloon is allowed to rise freely, and a card is attached, to be returned by the finder, with name, date, and place. The most elaborate series of observations of this sort are those of M. Louis Bonvallet, at Amiens, who, from May, 1888, to the end of 1890, sent up 97 paper balloons, varying in volume from 50 to 1,800 liters. The general results are given by M. Gaston Tissandier in *La Nature*, 1891–1892, pages 259, 260. The amount of instruction from them is small and disappointing.

A more instructive but more expensive method is that of pilot balloons carrying automatic registering instruments. This method of sounding the upper air was proposed by Le Verrier in 1784, and has within the last few years been repeatedly tried in France. In the last four months of 1892 M. Hermite sent up 13 such balloons, all of which reached an altitude of over 9 kilometers, or 6¼ miles; and one sent up on March 21, 1893, must have reached an elevation of over 16 kilometesr, or 10 miles. These balloons carry means for the automatic record of pressure and temperature, but the last mentioned found so cold temperatures that for a considerable time the specially prepared ink could not perform its functions. They also carried a device for releasing and dropping cards, to enable the following of the course of the baloon; but this has not been successful, as the fuse which releases the card is soon extinguished. In the ascent of March 21, out of 600 cards taken up, only 400 were released, and of these only five or six were recovered. It is found, however, that the recovery of the balloon is much easier than had been expected, as a printed direction on the balloon itself leads to its recovery as soon as it falls into the hands of any intelligent person.

The preceding methods, while they would give highly interesting and instructive results, are somewhat imperfect as means of obtaining all the information needed by meteorologists. Much better for this purpose would be systematic work by a meteorologist who would make the ascension himself. Evidence points to the conclusion that the cloud layer, and perhaps the upper cloud surface, is a region of especial activity in meteorological phenomena, but the

facts on which such a conclusion could be verified are of such character that they would probably escape any automatic registry. Their record requires the presence of a trained meteorologist. These observations should be systematic, as the sporadic ones are of relatively little value. A meteorologist should ascend twice a day to a considerable height, and should keep this up through all kinds of weather and through the season. The elevation need not be great; probably the first 20,000 feet include the layer of air in which the meteorological phenomena which we call weather are active. At least the stratum of this thickness is far more important to us than all the rest of the depth of the atmosphere.

The best way to test progress is to sit down and conscientiously write answers to questions on the subjects which have been studied. In order to assist students in this systematic work, we propose to insert a set of questions every month. The questions will refer especially to matters treated in 'Honours Physiography,' but as we assume an acquaintance with the contents of the advanced and elementary books in the same series, they may be tests of knowledge of points described in these two books. We shall also give questions upon the subjects of the notes. Chapters I. and IV. of 'Honours Physiography' should be understood before attempting to answer the following questions. The first fifteen pages of the former chapter may, however, be omitted for the present. At the ends of the questions are the references to the pages where the subjects are dealt with. A.P. = 'Advanced Physiography'; H.P. = 'Honours Physiography.'

(1) Compare the equatorial telescope with the transit instrument. (A.P., p. 39.)
(2) How is a micrometer used to determine the angular diameter of a planet? (H.P., p. 17.)
(3) How is the orbit of a double star determined? (H.P., p. 19.)
(4) What is the laboratory evidence which enables us to discriminate between very hot and relatively very cool stars? (H.P., p. 27.)
(5) State the various methods now employed in obtaining the spectra of the sun, stars, and nebulæ. (A.P., pp. 42, 43.)
(6) Describe and explain the use of the essential parts of a spectroscope. (A.P., p. 41.)
(7) What are the chief uses of a transit instrument? (A.P., p. 35.)
(8) Describe the methods which have been devised for recording the duration and intensity of sunshine on different days. (H.P., p. 81.)
(9) Give an account of the results which have been obtained by recent research in connection with the origin of fogs and mists. (H.P., p. 81.)
(10) Give an account of the methods employed in determining the temperature of the higher air. (H.P., p. 81; also note above.)
(11) Describe the chief results of recent work on the liquefaction of gases. (H.P., p. 82.)
(12) State what you know of the supposed causes of the glacial epoch which have been advocated by different authors. (H.P., p. 97.)
(13) State the chief systems which have been proposed for the classification of clouds. ('PRACTICAL TEACHER,' March, p. 506.)

MATHEMATICS.

STAGES 2 AND 3, SCIENCE AND ART DEPARTMENT.

By G. A. BAXANDALL,
Assistant Mathematical Instructor, Royal College of Science, London.

STAGE 2.

Algebra.

Solution of Ex. 17 (5).

Solve $40\left(x+\frac{1}{x}\right)^2-286\left(x+\frac{1}{x}\right)+493=0$.

This is of the quadratic form, for if we put z for $x+\frac{1}{x}$ we get $40z^2-286z+493=0$; the factors of 493 are 17 and 29, and by one or two trials we obtain

$$(10z-29)(4z-17)=0, \text{ } i.e., \text{ } z=\tfrac{29}{10} \text{ or } \tfrac{17}{4},$$

and therefore $x+\frac{1}{x}=\frac{17}{4}$, or $x+\frac{1}{x}=\frac{29}{10}$,

both of which quadratics are easily solved.

Solution of Ex. 17 (6).

Solve $x^2+\frac{9}{x^2}-4\left(x+\frac{3}{x}\right)-6=0$.

This is not of the usual quadratic form exactly, for $x^2+\frac{9}{x^2}$ is not $=\left(x+\frac{3}{x}\right)^2$, but it will be if we add 6. Therefore add 6 and subtract 6 so as really not to alter it; we then get

$$x^2+6+\frac{9}{x^2}-4\left(x+\frac{3}{x}\right)-12=0, \text{ or}$$

$$\left(x+\frac{3}{x}\right)^2-4\left(x+\frac{3}{x}\right)-12=0,$$

which can be solved like the above.

Read Chap. XX., H.S., or Chap. XXVI., H.K. These chapters deal with Simultaneous Equations which involve quadratics, and the student will probably have many difficulties. This arises from the difficulty of laying down any general methods of solution for the various types of problems. Many of the problems are worked by means of special artifices, with which familiarity can only be acquired after considerable experience. Perhaps, on the whole, the student had better pay most attention to the case where one of the two equations contains a term in x to the first power, a term in y to the first power, and a numerical quantity. In such a case x can be expressed in terms of y and its value substituted into the second equation, thus obtaining an equation containing y only. For example, $2(x+y)=7$, and $x^2-4y^2=8$. From the first we can get $x=\frac{7}{2}+y$, and substituting this value of x into the second equation we obtain $(\frac{7}{2}+y)^2-4y^2=8$, which can be solved in the ordinary way as a quadratic for y.

Work out eight or ten examples which are of this type; you may select them from the chapters above named. Also the following:—

18. $x+y=4$. $x^2+2y^2=34$.
19. $x^2-6xy+11y^2=9$. $x-3y=1$.
20. $x-2y=2$. $3xy=36$.
21. $x^2-xy-y^2=\frac{1}{12}xy$. $x-y=2$.
22. $\frac{1}{x}+\frac{1}{y}=2$. $x-y=2x+y$.
23. $2x-3y=1$. $2x^2-5xy+3y^2=4$.

Ans. (18) $x=4, \frac{16}{3}$; $y=3, \frac{5}{3}$.
(19) $x=7, -5$; $y=2, -2$.
(20) $x=6$ or -4; $y=2, -3$.
(21) $x=5, \frac{3}{4}$; $y=3, -\frac{9}{4}$.
(22) $x=1$; $y=1$.
(23) $x=11$; $y=7$.

Another distinct type of example is that which occurs in Art. 258, H.S., or Art. 206, H.K.

Work Exs. XCVII., H.S., 8, 9, 12, or Exs. XXVI., c., H.K., 11, 14, 16, and Exs. XCVIII., H.S., 10, 13, 31, or H.K. Chap. XXVII., 6, 12, 14, 16.

Trigonometry.

Ex. 10 (December.) Why is it absurd to say that $2\sin A=3$, or that $3\sec B=2$?

(1) If $2\sin A=3$, then $\sin A=1\frac{1}{2}$, but by definition the sine of an angle is the ratio of perpendicular to hypotenuse, and the above states that the perpendicular is $1\frac{1}{2}$ times the hypotenuse, which is clearly absurd.

(2) If $3\sec B=2$, then $\sec B=\frac{2}{3}$, but by definition the secant of an angle is the ratio of hypotenuse to the side adjacent to the angle, and the above states that the hypotenuse is only $\frac{2}{3}$ that of side adjacent, which is clearly absurd.

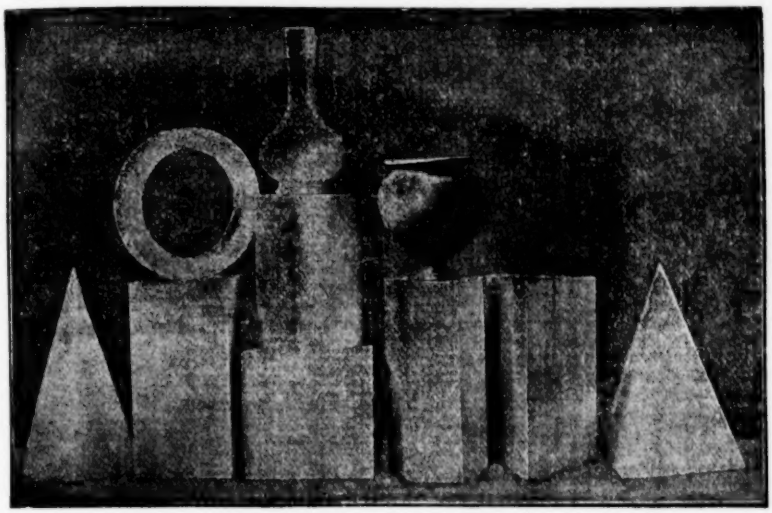
Want of space forbids us giving more solutions

Again we assume that the student has thoroughly learnt the definitions of sine, cosine, tangent, etc. It will now be necessary to find their numerical values for the particular angles 0°, 30°, 45°, 60°, and 90°.

Read Arts. 75–81, H.S., or Arts. 87–95, H.K.

Here a warning is necessary. The student must not *learn* a single one of these numerical values, but he must at once make himself familiar with the *relative lengths* of the sides in each of the triangles, Figs. 1 and 2.

In Fig. 1, where the angles are 45°, 45°, 90°, the sides opposite are in the ratio 1, 1, $\sqrt{2}$; in Fig. 2, where the angles are 30°, 60°, 90°, the sides opposite are in the ratio 1, $\sqrt{3}$, 2. Then if he can carry these in his mind (and little effort is required), as well as the definitions of sine, cosine, etc., he cannot possibly have a difficulty in getting the numerical values of sine, cosine, etc., for the angles, 30°, 45°, 60°. If the value of a trigonometrical ratio be required for



From a photograph of one of the large sets.

CUSACK'S

LARGE SET OF

10 Drawing Models

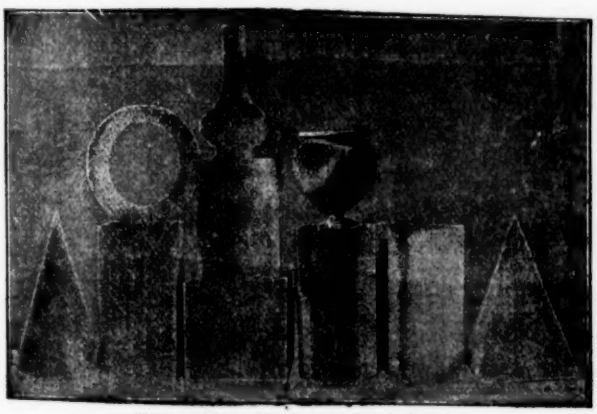
(INCLUDING 2 VASE FORMS).

Perfect in shape; strongly made, in wood; and painted. Size: cube 10 in., and other Models in proportion, as shown in diagram. The size for Schools of Art and Art Classes. The size prescribed by the Science and Art Department for the May Exams.

Price 40/- net, Carriage paid.

Packing Case and Packing Free.

CITY OF LONDON BOOK DEPÔT,
WHITE STREET & FINSBURY STREET,
MOORFIELDS, LONDON, E.C.



From a photograph of one of the small sets.

CUSACK'S

SMALL SET OF

10 DRAWING MODELS

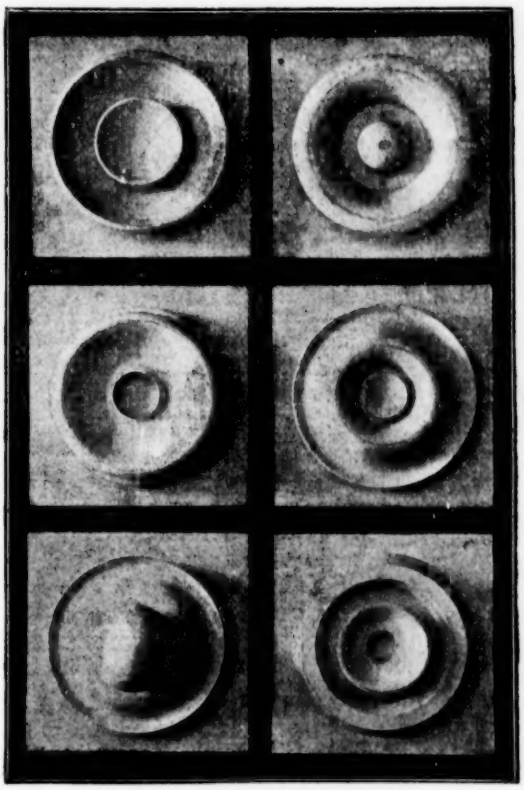
(INCLUDING 2 VASE FORMS).

Perfect in shape; strongly made, in wood; and painted. Size: cube 6½ in., and other Models in proportion, as shown in diagram. Large enough for all School purposes.

Price 20/- net, Carriage paid.

Packing Case and Packing Free.

CITY OF LONDON BOOK DEPÔT,
WHITE STREET AND FINSBURY STREET, MOORFIELDS, LONDON, E.C.



From a photograph of the set of casts.

CASTS FOR SHADING. **CASTS FOR SHADING.**

CUSACK'S SET OF 6 ELEMENTARY ROSETTE FORMS

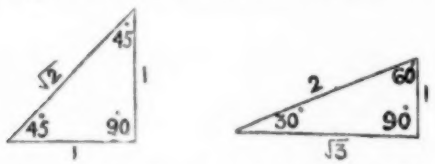
(In Wood) afford the best possible practice for beginners in Shading.

Price 10/6 net, Carriage paid. Packing Cases and Packing Free.

As it has been discovered that certain school stationers having been asked to supply Cusack's Models supplied other badly made Models and misshapen Vases instead, and as Professor Cusack holds himself directly responsible for the accuracy and perfection of all Models manufactured specially to his order, to prevent similar frauds in future Cusack's Models will not be obtainable through the trade generally, but will be supplied direct, **Carriage paid,** at the prices above quoted. All orders to be sent direct to the

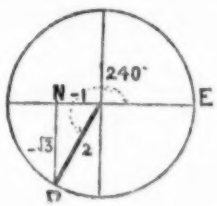
CITY OF LONDON BOOK DEPÔT, White Street and Finsbury Street, Moorfields, London, E.C.

an angle o°, a very small angle must be drawn, and the value of the ratio for this small angle observed, then as the angle is gradually made to approach o° the effect on the sides involved in the ratio can



be observed and the value of the ratio determined. Similarly for 90°, an angle a little less than 90° must be taken and then made to approach 90° gradually. There is something to be gained by the acquisition of the habit of drawing neat and accurate figures; for example, when drawing the triangle with angles 30°, 60°, 90°, and sides in the ratio 1, $\sqrt{3}$, 2, care must be taken to make the angles 30° and 60° appear distinctly unequal, so that there shall be no mistake in attaching the relative numbers 1 and $\sqrt{3}$ to the sides opposite. When the student has acquired the habit of correctly finding the ratios for the above angles, there is nothing to prevent him applying the same method to certain angles greater than 90°. Let him supply a figure similar to Fig. 3. Let the revolving radius describe angles of 30°, 60°, 120°, 150°, 210°, 240°, 300°, 330°, and in each case draw a perpendicular from its extremity on to the horizontal diameter, we shall thus get eight triangles, each having the angles 30°, 60°, 90°. The sides will in each case be in the ratio of 1, $\sqrt{3}$, 2, but we shall have to be careful in attaching the proper *signs* to 1 and $\sqrt{3}$. Here is the only difficulty. For example, suppose we are getting the sine, cosine, and tangent of 240°, then -1 must be written for ON, $-\sqrt{3}$ for PN, and 2 for OP.

FIG. 3.



$$\text{Sin } 240° = \frac{PN}{OP} = \frac{-\sqrt{3}}{2} = -\frac{\sqrt{3}}{2}.$$

$$\text{Cos } 240° = \frac{ON}{OP} = \frac{-1}{2} = -\tfrac{1}{2}.$$

$$\text{Tan } 240° = \frac{-\sqrt{3}}{-1} = +\sqrt{3}.$$

Work out the following examples :—

13. Show that $\sin^2 30° + \sin^2 45° + \sin^2 60° = \frac{3}{2}$.

14. If A = 60°, B = 30°, and C = 45°, show that (sin A − sin C) (cos B + cos C) = $\sin^2$ B.

15. What is the angle less than 360° such that its sine is $-\frac{1}{2}$, and its cosine $\frac{\sqrt{3}}{2}$? What would have been your answer if nothing had been said about its cosine? (Draw a figure.)

Ans. 330° ; 210° or 330°.

16. Having given that tan 21° 48′ = 0·4, find by means of figures another angle between 180° and 270° whose tangent is 0·4. What are the two angles between 0° and 360° whose tangents are each $-0·4$? Ans. 201° 48′ ; 158° 12′ and 338° 12′.

17. Find by referring to a figure which of the trigonometrical ratios increase as the angle increases from 0° to 90°.

18. Given sin 36° 53′ = 0·6, and cos 36° 53′ = 0·8 ; find the angle (less than 360°) whose sine is $-0·6$ and cosine $-0·8$. Ans. 216° 53′.

19. Referring to Fig. 3, suppose that a radius starting at OE turn through an angle POE equal to 20° ; draw PN perpendicular to OE. Now, suppose the radius to continue to revolve once round, you are required to draw it when in positions such that if perpendiculars be drawn to horizontal diameters the triangles so found are equal in all respects to PON. What are the angles described by the radius when in these positions?

20. Find sine, cosine, and cotangent for angles of 150°, 210°, and 315°, and show that sec 225° − 2 cos 135° = 0.

Geometry.

If AB is a straight line divided in C, so that rectangle AB, BC equals the square on AC, show that the squares on AB and BC are together equal to three times the square on AC.

In the triangle ABC let AB equal AC; produce BC to D; join AD ; show that the square on AD exceeds the square on AB by the rectangle BD, DC.

STAGE 3.

Algebra.

Solution to Ex. 56, p. 268, Tod.—Show that the sum of any $(2n + 1)$ consecutive integers is divisible by $2n + 1$.

Let a = first term, then the series is a, $a + 1$, $a + 2$,..... $2n + 1$ terms, the last being $a + 2n$.... Applying the formula for the sum of n terms of an A.P. we get

$$s = \frac{2n + 1}{2}(2a + 2n) = (2n + 1)(a + n),$$

which is clearly divisible by $2n + 1$.

Example.—Sum to n terms $5 + 55 + 555 + \ldots$

Solution.—One of the greatest difficulties which a student has is that of writing down the general term of a series. Here, for example, it is necessary to determine the n^{th} term. This is always effected by examining one or two particular terms. Thus in this series we must, by some law yet to be found, express 55 in terms of 2 (the number of term), and similarly by the same law express 555 in terms of 3 (the number of term); then, if this law is found to hold for each term, there will be no great difficulty in writing the n^{th} term. Now $55 = 50 + 5 = 5(10^1 + 1)$, and $555 = 500 + 50 + 5 = 5(10^2 + 10^1 + 1)$, and we observe that in each case the index of that power of 10 which comes first in the brackets is 1 less than the number of term we are dealing with. Hence the n^{th} term $= 5(10^{n-1} + 10^{n-2} + \ldots\ldots 10^2 + 10^1 + 1)$, a G.P. whose sum

$$= \frac{5(10^n - 1)}{10 - 1}.$$

Writing the series again, we get

$$s = 5 + 55 + 555 + \ldots\ldots \frac{5(10^n - 1)}{10 - 1}.$$

This is neither a G.P. nor A.P., so try multiplying each side by some number so that on subtraction we get something easy to deal with. For instance, multiply by 10 and we get

$$10s = \quad 50 + 550 + \ldots\ldots\ldots\ldots\ldots + \frac{50(10^n - 1)}{10 - 1};$$

subtract and we get

$$-9s = 5 + 5 + 5 + \ldots\ldots n \text{ times} \quad - \frac{50(10^n - 1)}{10 - 1},$$

$$\therefore s = \frac{50(10^n - 1)}{81} - \frac{5n}{9}.$$

Example.—A, B, C, D.....M, N are a series of numbers in geometrical progression, show that $(A^2 + B^2 + \ldots\ldots M^2)(B^2 + C^2 + \ldots\ldots N^2) = (AB + BC + CD + \ldots\ldots MN)^2$.

Solution.—If these numbers are in G.P. we must at once introduce a common ratio ; let it be r ; then $A = A$, $B = Ar$, $C = Ar^2$, and so on. $M = Ar^{12}$ and $N = Ar^{13}$, so that the left hand side of the equation becomes—

$$[A^2 + A^2r^2 + A^2r^4 + \ldots\ldots A^2r^{24}][A^2r^2 + A^2r^4 + \ldots\ldots A^2r^{26}]$$
$$= A^2\ [1 + r^2 + r^4 + \ldots\ldots r^{24}]\ A^2r^2\ [1 + r^2 + r^4 + \ldots\ldots r^{24}]$$
$$= A^4r^2\ [1 + r^2 + r^4 + \ldots\ldots r^{24}]^2.$$

The right hand side $= [A^2r + A^2r^3 + A^2r^5 + \ldots\ldots A^2r^{25}]^2$
$$= [A^2r\ (1 + r^2 + r^4 + \ldots\ldots r^{24})\ ]^2$$
which is manifestly the same as the left hand side.

Work the following examples :—

5. The sum of ten terms of a certain arithmetic series, from the eleventh to the twentieth inclusive, is 320; and the tenth term is to the thirteenth as 7 to 9 ; find the first term and the common difference. Ans. 3; 2.

6. The sum of a certain geometrical series to 6 terms is $13\frac{33}{64}$, and the sum of the same series to infinity is 14 ; find the first term and common ratio. Ans. 7; $\frac{1}{2}$.

7. If a, b, c are in arithmetical progression, b, c, a in geometrical progression ; prove that c, a, b will be in harmonical progression.

8. There are $2m + 1$ terms in arithmetical progression. The first term is a, and the last is b ; what is the middle term?

Ans. $\frac{a + b}{2}$.

9. A series whose 1st, 2nd, and 3rd terms are respectively

$$\frac{1}{\sqrt{2}},\ \frac{1}{1+\sqrt{2}},\ \frac{1}{4+3\sqrt{2}}$$

is either arithmetic or geometric. Determine which it is, and write down the 4th term.

The series is arithmetic; 4th term $= \dfrac{-1}{3+2\sqrt{2}}$.

10. A number consists of 3 digits in geometrical progression. The sum of the right-hand and left-hand digits exceeds twice the middle digit by unity; and the sum of the left-hand and middle digits is two-thirds of the sum of the middle and right-hand digits. Find the number. Ans. 469.

11. Write down the n^{th} terms of the following series:—

$1 + 4 + 7 + 10 + \ldots\ldots\ldots\ldots$

$1 + \frac{4}{3} + \frac{7}{3^2} + \frac{10}{3^3} + \ldots\ldots\ldots\ldots$

$2 + 22 + 222 + \ldots\ldots\ldots\ldots$

$1 + 3x + 6x^2 + 10x^3 + \ldots\ldots$

Ans. $3n-2$; $\dfrac{3n-2}{(n-1)^{n-1}}$; $2\,(10^{n-1} + 10^{n-2} + \ldots\ldots 1)$;

$\dfrac{n}{2}(n+1)\,x^{n-1}$.

Trigonometry.

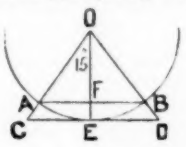
Solution to Ex. 8 (December).—

$n = 12$, $\text{COE} = \dfrac{\pi}{12} = 15°$;

$\text{AB} = 2\text{AF} = 2r \sin 15°$;

$\text{CD} = 2\text{CE} = 2r \tan 15°$;

$\therefore$ diff. of perimeters $= 12 \times 2r\,(\tan 15° - \sin 15°) = a$ (1).



Area of inscribed polygon $= 12 \times \dfrac{r^2}{2} \sin 30° = 3r^2$;

,, circum. ,, $= 12r^2 \tan 15° = 12r^2\,(2 - \sqrt{3})$,

$\therefore$ difference of areas $= 12r^2\,(2-\sqrt{3}) - 3r^2 = r^2\,(21 - 12\sqrt{3})$;

but since r does not occur in the answer, substitute from (1), thus—

$$r = \frac{a}{24}\,(\tan 15° - \sin 15°);$$

$$\therefore \text{ diff. of areas} = \frac{a^2}{576}\,\frac{21 - 12\sqrt{3}}{(\tan 15 - \sin 15°)^2}$$

$$= \frac{a^2}{192}\,\frac{7 - 4\sqrt{3}}{\tan^2 15°\,(1 - \cos 15°)^2}$$

$$= \frac{a^2}{192}\,\frac{7 - 4\sqrt{3}}{(2-\sqrt{3})^2}\,\frac{1}{(1-\cos 15°)^2}$$

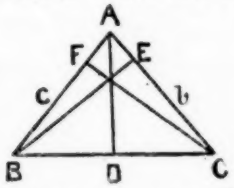
$$= \frac{a^2}{192\,(1 - \cos 15°)^2}.$$

Solution to Ex. 11 (December).—

$\text{AD} = c \sin \text{B}$;

similarly $\text{BE} = a \sin \text{C}$, $\text{CF} = b \sin \text{A}$;

$\therefore$ product of perps. $= abc$, sin A, sin B, sin C.



Now $\tan \text{A} = 1$; $\therefore \sin \text{A} = \dfrac{1}{\sqrt{2}}$;

$\tan \text{B} = 2$; $\therefore \sin \text{B} = \dfrac{2}{\sqrt{5}}$;

$\tan \text{C} = \tan (180 - \overline{\text{A} + \text{B}})$

$$= \tan (\text{A} + \text{B}) = -\frac{\tan \text{A} + \tan \text{B}}{1 - \tan \text{A}, \tan \text{B}} = -\frac{1+2}{1-2} = 3;$$

$$\therefore \sin \text{C} = \frac{3}{\sqrt{10}};$$

$$\therefore \text{ prod. of perps.} = abc\,\frac{1}{\sqrt{2}},\ \frac{2}{\sqrt{5}},\ \frac{3}{\sqrt{10}}$$

$$= \frac{3}{5}\,abc.$$

We shall now indicate certain portions of the subject which it will be necessary for the student to read up. In almost every text book will be found the method of determining general expressions for angles which have a given sine, or cosine, or tangent. The method most frequently adopted contains one difficulty, namely, that after certain observations the general expression is stated, and the student has to satisfy himself of its inclusive nature by trial. This difficulty is partly evaded in *Loney's* latest book, by the methods in Arts. 102, 103, 104.

Work out the following:—

13. What is the most general value of θ which satisfies the equation (1) $\tan\theta + 1 = 0$; (2) $4\sin^2\theta = 3$; $\sec^2\theta = \frac{4}{3}$.

Ans. $n\pi + \frac{3\pi}{4}$; $n\pi \pm \frac{\pi}{3}$; $n\pi \pm \frac{\pi}{6}$.

The following parts of the subject, which will be found in one or the other of Lock's elementary work, Todhunter's, or Loney's, must be read:—

1. Geometrical proofs of the formulæ for sine, cosine, and tangent of the sum or difference of two angles. It is necessary to be able to show that these formulæ hold for angles of any magnitude.

2. Geometrical and other proofs of the formulæ for the sum or difference of two sines or cosines.

3. Proofs, geometrical and otherwise, of the formulæ for multiple and submultiple angles, special attention being paid to the proper signs which are to be attached to the root symbols which occur in these formulæ.

We now add a few examples.

14. Show that (1) $\cos 3\text{A} + \cos 5\text{A} + \cos 7\text{A} + \cos 15\text{A} = 4 \cos 4\text{A} \cos 5\text{A} \cos 6\text{A}$.

(2) $2 \cos \frac{\pi}{13} \cos \frac{9\pi}{13} + \cos \frac{3\pi}{13} + \cos \frac{5\pi}{13} = 0$.

(3) $\cos 4a = 1 - 8\cos^2 a + 8\cos^4 a$.

15. Given $\cos 330° = \dfrac{\sqrt{3}}{2}$, show that $\sin 165° = \dfrac{\sqrt{3}-1}{2}$,

and $\cos 165° = -\dfrac{\sqrt{3}+1}{2\sqrt{2}}$.

16. Find all the values of A less than four right angles which satisfy the equation

$$(\sin \text{A} - \cos \text{A})\,\sqrt{2} = 1.$$

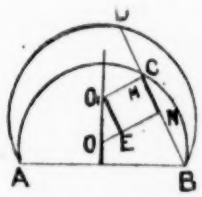
Point out which of the values suppose that $\sqrt{2}$ is positive, and which negative.

Ans. 75°; 195°; 15°; 255°.

17. If A and B are angles of a triangle, find cos C, having given $\cos (\text{A} - \text{B}) = \dfrac{31}{32}$. Ans. $\frac{1}{4}$.

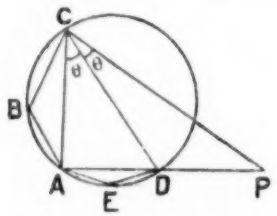
Geometry.

Ex. 3 (December). Let O, O^1 be the centres of the two circles, and draw any line through B, cutting the circles in C and D; we want to determine how to draw the line so that CD shall be the greatest



possible. Draw the perpendiculars ON, O^1M, then $\text{CD} = \text{BD} - \text{BC} = 2\text{BM} - 2\text{BN} = 2\,(\text{MN})$, so that CD is greatest when MN is greatest. Draw O^1E perpendicular to ON, then $\text{MN} = \text{OE}$. Now O^1EO is a right-angled triangle, and O^1E can never be greater than O^1O, but is greatest when equal to OO^1, which happens when BD is parallel to O^1O. Hence BD has to be drawn perpendicular to AB.

Ex. 4 (December). ACP is a given triangle, CD bisects angle ACP, and a circle is drawn round ACD; to prove that the difference of the angles AED and ABC is equal to CPA. In quadrilateral



CBAD, angle ABC = 2 right angles — CDA. In quadrilateral CAED, angle AED = 2 right angles — ACD; ∴ on subtracting, AED — ABC = CDA — ACD = (DCP + CPD) — ACD = CPD. Q.E.D.

Work the following riders :—

5. P is a fixed point inside a given circle; find the locus of the middle point of the chords which subtend a right angle at P.

6. A, B, are two points on the circumference of a circle; AC and BD are chords intersecting at E; show how to draw the chords, so that AE may be three times EC, and DE three times EB.

7. Two circles are drawn touching a given straight line in two fixed points, and having a common chord of given length; what is the locus of the middle point of that chord?

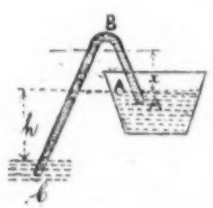
SOLUTIONS TO QUESTIONS IN THEORETICAL MECHANICS.

BY F. CASTLE, M.I.M.E.

Continued from p. 15, *November Science Supplement.*

12. Describe the siphon, and mention some of its uses.

Explain why water cannot be drawn by a siphon from a lower to a higher level. (12)



In its simplest form it consists of a bent tube ABC, one end of which is immersed in the liquid to be removed, while the other end either dips into the liquid of the receiving vessel or discharges into the air.

Let H denote the height of a column of the liquid equivalent to the atmospheric pressure. Let the siphon be full of liquid, and assuming a diaphragm to be drawn across it and at a height x above the free surface at A. The pressure on the diaphragm will be $H - x$ and $H - (x + h)$ on the side AB and BC respectively. As the latter is less than the former by h, it follows that the diaphragm experiences a resultant force (on the side AB), due to a depth h of the liquid; hence if diaphragm be removed, the liquid is propelled in the direction from A to C. The pressures are equal when A and C are at the same level and the action ceases.

In practice, the two legs of the siphon are usually unequal in length, but this is not essential; the direction of flow depends only on the levels of the two free surfaces. As the flow is due to atmospheric pressure, it is necessary that the highest point, B, of the siphon should not exceed H (H for water is about 33 ft).

In order to make a siphon begin working, means must be employed to fill it with the liquid. This can be done in some cases by dipping it into the liquid. and then placing it in position while the ends are kept closed.

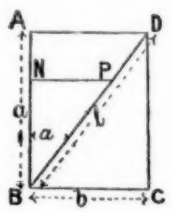
In large siphons the air is usually exhausted from the tube by means of a pump.

It is evident that as the direction of flow is from the higher level, A, to the lower, C, the siphon cannot be used to raise water from the lower to the higher level.

The siphon is used for emptying casks, &c.; also for transferring acids from one vessel to another, and for drainage purposes.

Advanced Stage.

21. The sides of a rectangle are a and b; find the moment of inertia about the side a of a diagonal considered as a line of uniform density. (20)



Let ABCD be the given rectangle, in which AB = a, BC = b, and BD = l.

If M denote the mass of the diagonal BD, and if we conceive the diagonal to be divided into a large number (n) of equal parts, the mass of each part will be $\frac{M}{n}$.

The distances of the different parts from B will be $\frac{l}{n}, \frac{2l}{n}, \frac{3l}{n}$, etc., and the distances from the axis AB of any particle such as P will be PN, where PN = BP sin α.

∴ The distances from the axis AB will be $\frac{l}{n}\sin\alpha, \frac{2l}{n}\sin\alpha, \frac{3l}{n}\sin\alpha$, etc., and the squares of the latter will be

$$\left(\frac{l\sin\alpha}{n}\right)^2, 4\left(\frac{l\sin\alpha}{n}\right)^2, 9\left(\frac{l\sin\alpha}{n}\right)^2, \text{etc.}$$

Hence if I denote the moment of inertia of the diagonal BD about the side AB

$$I = \frac{M}{n}\left\{\left(\frac{l\sin\alpha}{n}\right)^2 + 4\left(\frac{l\sin\alpha}{n}\right)^2 + 9\left(\frac{l\sin\alpha}{n}\right)^2 + \ldots\ldots\right\}$$

$$= \frac{Ml^2}{n^3}\left(1^2 + 2^2 + 3^2 + \ldots\ldots + n^2\right), \sin^2\alpha;$$

but $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n^3}{3}$ (when n is indefinitely increased).

$$\therefore I = \frac{Ml^2}{3}\sin^2\alpha$$

$$\left(\sin^2\alpha = \frac{b^2}{l^2}\right) \qquad = \frac{Mb^2}{3}.$$

(To be continued.)

(*Continued from p.* 378.)

(2) Insert two numbers between 4 and 24, so that the first three are in G.P., and the last three in A.P.

Let r be the required common ratio of the first three, which are in G.P., so that the numbers are--

$$4, 4r, 4r^2, 24,$$

the last three being in A.P.,

we have $4r^2 - 4r = 24 - 4r^2$;

$$\therefore 2r^2 - r - 6 = 0,$$

or $(r-2)(2r+3) = 0,$

giving $r = 2$, or $-\frac{3}{2}$.

Hence the numbers are—

4, 8, 16, 24; or 4, —6, 9, 24.

(3) Find an expression of the second degree in x, which shall have the values 9, 24, 21 when $x = -2, 1, 4$ respectively.

Let $ax^2 + bx + c$ be the required expression.

Putting $x = -2$, we get

$$4a - 2b + c = 9. \quad (1)$$

Similarly, putting $x = 1$ and 4, we get

$$a + b + c = 24, \quad (2)$$

$$16a + 4b + c = 21. \quad (3)$$

Solving (1), (2), and (3), we get

$$a = -1, b = 4, c = 21,$$

and hence expression is

$$-x^2 + 4x + 21.$$

Euclid Course for January.

A careful revision should be made of the four books.

Hints on December riders:

(1) (*a*) is II. 7.

(*b*) is II. 11.

(2) is IV. 5.

(3) Describe an isosceles triangle ABC, as in IV. 10, B being the vertex. With centre B and radius BA or BC describe a circle. The angle ABC being 36°, BC will be the side of a regular decagon inscribed in the circle.

MECHANICS.

Course for January.

The time left must be devoted to revising bookwork; the parallelogram and triangle of forces; the chapters on moments and couples, centre of gravity, the formulæ for rectilinear accelerated motion and their proofs, the laws of motion, and the equation $P = mf$; Boyle's law, and a description of hydrostatical instruments—these and many other points should be looked up.

Illustrative Examples :—

(1) A stone mass, 6 lbs., falls from a height of 80 feet, and is brought to rest by penetrating 2 feet into sand; find the force (supposed uniform) exerted by the sand.

The body falls 82 feet (including 2 feet into the sand);

$\therefore$ loss in energy $= 6 \times 82$ foot-pounds.

If P lbs. = force exerted by sand, we have

work done by this force = 2P foot-pounds;

$$\therefore 2P = 6 \times 82,$$

$$\therefore P = 246 \text{ lbs.}$$

(2) If the same stone be moving horizontally with a velocity of 100 feet per second, what force will stop it in 4 feet?

Let P poundals be the force.

Then loss of energy of stone

$= \frac{1}{2}mv^2 = \frac{1}{2} \times 6 \times 100^2$ foot-poundals

$= 30000$ foot-poundals.

Work done by opposing force = 4P foot-poundals.

$$\therefore 4P = 30000;$$

$$\therefore P = 7500 \text{ poundals}$$

$$= 234\tfrac{3}{8} \text{ lbs.}$$

Be able to prove that change of energy is equal to work done by the force to which the change is due. Learn something about the 'conservation of energy.'

(3) Two masses, 5 lbs. and 8 lbs., are connected by a string passing over a smooth pulley, find their acceleration.

Here the moving force = 3 lbs. = 96 poundals,

and the mass moving = 13 lbs.

Now $P = mf$;

$$\therefore 96 = 13f;$$

$$\therefore f = 7\tfrac{5}{13} \text{ feet per sec. per sec.}$$

Note that weight is proportional to mass; this follows from the fact that all bodies fall with the same acceleration, g.

Hence if m_1, m_2 lbs. be the masses of two bodies, their weights are $m_1 g$ and $m_2 g$ poundals (by formula $P = mf$), *i.e.*, are in the proportion $m_1 : m_2$.

CHEMISTRY.

Course for January.

Read up more especially the preparation and properties of ammonia, hydrochloric acid, nitric acid, and the oxides of nitrogen. Note that an acid always contains H, reddens litmus, may contain oxygen, as HNO_3, H_2SO_4, or may not, as HCl. When the hydrogen of an acid is replaced by a metal, as in NaCl, we have a salt, sodium chloride. If only part of the hydrogen is replaced, we have an acid salt, as in $NaHSO_4$.

Great progress may be made in chemistry by a thorough and careful revision.

Correspondence.

Teachers wishing to have their test papers corrected should send the same addressed to the 'Matriculation Editors,' care of Joseph Hughes and Co., Froebel House, St. Andrew's Hill, Doctors' Commons, London, E.C., and enclose a remittance of 6d. for each paper.

Students desiring to have the papers set in previous numbers corrected can have them corrected on the same conditions.

The Matriculation Editors will be pleased to reply briefly through these columns to those seeking advice.

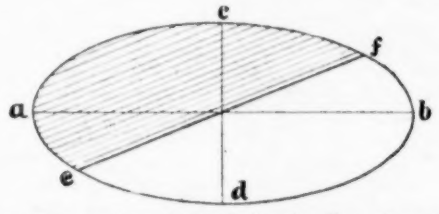
TEACHERS' DRAWING LESSONS.

MODEL.

STANDARD VI.

BY E. BUFFERY RIDGE,
Art Master under the London School Board.

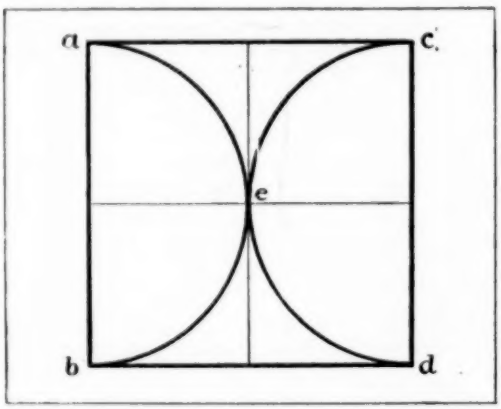
Curves.—The appearance of curves met with in model drawing requires considerable attention. A circle seen at an angle appears as an ellipse, and a part of a circle as part of an ellipse, but not always that part which presents a symmetrical curve. For instance, a semicircle may be shown not only by half

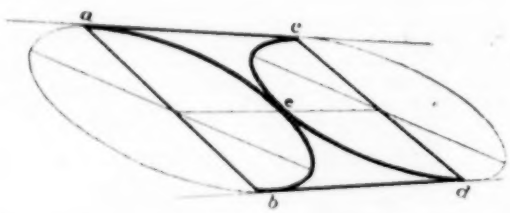


of the ellipse when divided by the line *ab* or by *cd* but by any other line passing through the centre as *ef*. Rub out, or cover over, one half of the ellipse so divided, and impress on the pupils that the figure

remaining is the correct representation of a horizontal half-circle in a particular position. The difficulty of drawing such a curve is nearly gone as soon as the scholars realize that it exists.

Draw a large square on a blackboard and fill it with two semicircles placed back to back. Use ruler and compasses, and make the chalk lines thick and distinct. Then place the board in a horizontal position on two chairs, or on top of one of the models (large cube, prism, or cylinder). The square and curves to be drawn.

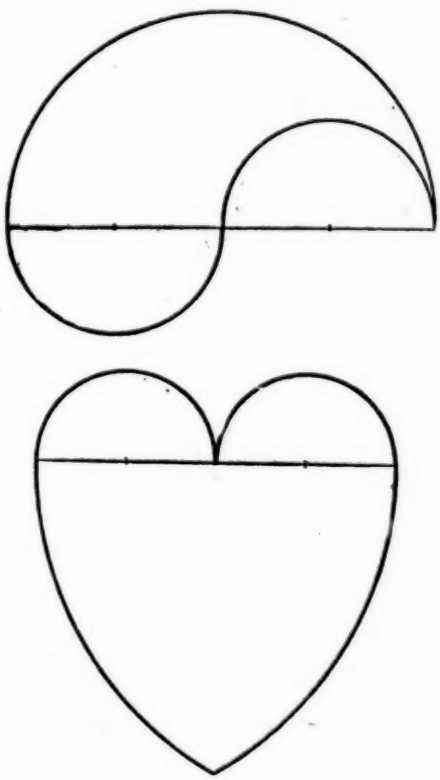




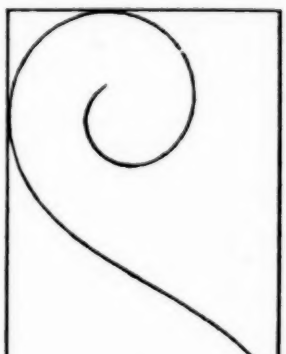
The curves are halves of two equal horizontal circles. *One circle* would be seen as an ellipse having its long axis horizontal. (Sketch on blackboard as in the figure). The other circle would be a similar ellipse touching the first, but partly behind it, and therefore rather smaller. Lines tangent to both ellipses would touch at *ac* and *bd*. Join *ab cd*, then *ab dc* with the half-ellipses enclosed represents the figure on the horizontal board. The centre of the figure is at *e*. Look at the four *quarter*-circles radiating from *e*. Two of them, *ae* and *ed* are nearly

straight, blending with each other to form the gentle curve *ad*. The other two, *ce* and *eb*, are much shorter and much more curved, forming the **S** shaped figure *cb*.

Let the class draw the square, putting in the diagonals, then the curves. *Notice the spaces between the diagonals and the curves.* Draw the same figure in other positions—upright, against the end wall of the room; inclined, leaning against a chair.



Two other simple curved figures to be used in the same manner. Any easy freehand copy can also be used.



COMING MEN.

XIV.—MR. SHADRACH HICKS,

Member of the N.U.T. Executive; Member of the Executive of the M.B.T.A.; Member of the Committee of the National Federation of Assistant Teachers.

WITHIN an easy walk of Finsbury Park station dwells Mr. Shadrach Hicks, a gentleman whose youthful appearance strikes one forcibly when it is recollected what an amount of work in connection with the educational world he has already accomplished.

The cheery welcome which we received was characteristic of the man, and as we have been for some time associated with Mr. Hicks in the educational arena, we were all the more able to obtain from him such particulars as were necessary for the purposes of this sketch.

Very Faithfully Yours, Shadrach Hicks.

Mr. Hicks is a west countryman, possessed of the distinctive, deliberate style of speech peculiar to the locality from which he hails.

He served his apprenticeship as a pupil teacher under the St. George School Board, Bristol. Entering the Training College at Culham in 1884, he underwent two years' training, and came to London in 1886. He was, and is at present, engaged in the Montem Street Higher Standard School, Tollington Park, described by H.M. Inspector as 'a highly meritorious school.'

His educational labours outside school were first of all utilised in connection with the Finsbury and City Teachers' Association. For two years he served as press secretary to this large organisation, and another couple of years he has devoted to the requirements of the secretary to the Orphanage Committee.

In addition to the work he has undertaken for the N.U.T., Mr. Hicks occupies a position on the Executive of the Metropolitan Board Teachers' Association. Every representative at the Conferences of the N.U.T. has carried away with him some impression of the striking and well-known figure of Mr. Hicks. His first speech in Conference was at Leeds in 1892, and it attracted much attention. In an article entitled 'Conference Leaders,' the *Schoolmistress* of April 28th, 1892, said:—

'Amongst the new men who showed considerable power were . . . and Mr. Hicks, of Finsbury.'

Again, the organ of the Union describing the same speech made by Mr. Hicks, said:—

'Mr. Shadrach Hicks, a young man of considerable promise and, indeed, of no mean achievement,' etc.

Prior to his appearance at Conference, he had written frequently to the columns of the *Schoolmaster*, advocating the New Unionism and endeavouring to establish a strong forward policy.

At the Nottingham Conference of Assistant Teachers, he was selected as a candidate for the Executive of the N.U.T. At the same Conference he was successful in obtaining a position on the Assistant Teachers' National Committee.

At the Liverpool Conference of the Union he was declared elected to the Executive. The declaration of the poll at the Oxford Conference amply displayed the confidence placed in him by his fellow teachers.

The position of the assistant teacher has claimed much of his attention. On the question of Federation, Mr. Hicks opposed the principle recommended by the National Committee. Whilst believing that the organisations of the assistant teachers should be federated on a national basis, he wished to impose membership of the N.U.T. as a condition of membership of the Federation. This was the stand he adopted at the Derby Conference, and though unsuccessful in his endeavour, the Conference displayed its confidence in him by placing him upon the Federal Committee. Again, at the recent conference of assistant teachers held in Birmingham, he was elected on the Committee of the Federation. Both in connection with this organisation and with the N.U.T., his policy has always been to obtain a higher status and more reasonable conditions of service for the teacher.

On the 28th of April last, addressing a combined meeting at Nottingham, he discussed the question of 'A Living Wage for Teachers,' and the address will long be remembered by his hearers. His efforts to urge the members of the Union to adopt measures presumably of a somewhat extreme character in order to secure reasonable conditions, are indications of his views upon the principles of Unionism.

Several attempts he has already made in the direction of influencing the Union to take direct action for the betterment of the teacher's position. Replying to a query relative to these endeavours, Mr. Hicks said:

'Teachers are simply living in the dawn of

Unionism. They have possibilities of great things in their Union as it is at present constituted. What is necessary is a much higher subscription, which would secure for each member not only a reasonable professional status, but absolute independence in cases of capricious dismissal, breakdown, out of work, or any other circumstances incidental to their work.'

During his term of office on the Executive he has directed his attention chiefly to two matters, viz.:—'The Poorly Paid Teacher' and 'The Professional Status of the Teacher.'

These form titles to two of his 'Pioneer Pamphlets.'

Discussing the first of these subjects, he says:—'I hold that a man's daily task should at least bring him a living wage; that is, he should be able to keep himself and his family comfortably by means of his own peculiar calling.'

Mr. Hicks is of opinion that the N.U.T. should, in conference with the local branches of the Union, establish minimum salaries for those localities, below which no member should be expected to work. He is convinced that such a course would not be fraught with the dangers commonly placed to its credit. Here is his conclusion upon the adoption of such a policy.

'If the Union advance in this direction it will be Christianlike at least, because its first mission, its first sympathy, will be with the

MAN THAT IS DOWN.

Besides, true collectivism can only exist where each individual uses his best efforts for the general well-being. In short, if everyone held to every other like bricks and mortar, we should ere long be able to raise our minimum, and thus there would be a general rise, a general comfort, and not particular benefits here and everlasting misery there. This could be done continually, and would only be stopped when our payments became glaringly large in proportion to other professions. Of course, in such a mode of procedure you have to reckon with two things:—

(*a*) The possible flooding of the market by the Education Department; and

(*b*) The attitude of Non-Unionist Teachers.

But surely in these days of "Capital and Labour" and "The Living Wage" no Government would flood a market where the bare living wage is, in the majority of cases, actually inoperative. I cannot for one moment believe the Government would take such a step. Then with respect to the Non-Unionists, I fully agree that here lies the danger, but I am bold enough to think that even in their case, when they saw that the Union was making a

BOLD STAND FOR THE POORLY PAID TEACHER,

they would troop under the Union flag without delay.

Finally, I am strongly of opinion that the greatest menace, the most glaring danger, that threatens the comparatively well-paid teachers in our ranks to-day is the fact that equally qualified practitioners can be obtained for smaller salaries.'

Mr. Hicks speaks out on the present system of allowing teachers to qualify for their diplomas. Here is his opinion.

'In the foreground, before all other considerations, every teacher who steps in front of a class must be a fully trained certificated teacher, in the widest and truest sense. There must be room in our training colleges for all who are allowed to pass the entrance examination. The college must be a right down

REAL LIVE TRAINING INSTITUTION—

a place where the art of teaching shall be instilled every day; a place where, in every lesson that is given by the tutors, the art of teaching shall be set forth and practised there and then by some student immediately after the tutor has had his say. This is the kind of training our young teachers want. They themselves will see to the grave and solemn facts relating to 1066, 1215, 1314, 1688, etc., etc. They will soon assimilate the deep philosophy enshrouded in the productions of Mashonaland or Timbuctoo. So, too, will they master with a little help

THE GYMNASTICS OF "THE ADVERB."

Yea, they would not find the task of skeletonizing certain portions of the Liturgy very, very difficult. But unless they are taught how to teach; practised daily in the art; given confidence in speech; encouraged in aptness of illustration, they will leave the college very little better fitted for the life and work of a teacher than when they entered. Their course of study must be broad and humanistic. Remember they are to deal with humanity. They cannot be too highly trained in the great studies of history, mental and moral science, poetry, composition, ethics, economics, and why not in the ancient, sublime, and useful art of rhetoric?'

We raised the question of the necessity for teachers to be perpetually qualifying in order to teach certain subjects not covered by the Certificate Examination.

The reply we received was, to our mind, redolent of true educational progress.

'The certificate,' said Mr. Hicks, 'should be so framed as to include the great fundamental bearings of Science, Art, and Literature. It should be granted by the Universities, with which all training colleges should be affiliated. Once obtained, the certificate should be esteemed as embodying full professional powers. There should be no hurry and scurry and struggle for this and that paltry certificate for such and such work. The teacher's certificate should be one which states with certainty that the possessor *is able to teach*. Other additional subjects would be handled by the natural skill and extended experience of the teacher. As matters are tending now, many teachers will be qualifying for cardboards all their lives. Let us have a thoroughly sound, comprehensive training, with the certificate at the finish. This will be a capital step towards a professional status.'

Mr. Hicks regards the position of the assistant teacher as deplorable. He recognises that the Assistants' Federation has work which is peculiarly its own, and that there is, therefore, a necessity for its existence. At the same time, he is anxious that the N.U.T. shall be the organisation through which all actual work shall be accomplished.

The establishment of a qualifying percentage of union members in the membership of Assistants' Associations is a fact that he regards with satisfaction, but his efforts will be directed towards annually increasing the percentage until it will be an absolute condition of membership in the Federation that the teacher must also be a member of the Union.

Speaking upon the work of the Federation, he expressed the opinion that its most important duty was to press forward a more active policy in Union matters, and to utilise all its influence in the direction of establishing an effective Sustentation Fund.

Our conversation elicited the fact that Mr. Hicks demands a high standard of attainment from the teacher in order that he may possess the authority to teach. More than all, the narrowing influences of the present-day school life should be avoided. Whilst a student in training, Mr. Hicks displayed a great interest in subjects that were 'not in the time table.'

His general reading whilst in college was very largely confined to such subjects as Economics, Ethics, Moral Philosophy, Ruskinism, Darwinism, &c.

He was known as one of the foremost exponents of the art of teaching of his year.

Some time after leaving college he matriculated at the Royal University of Ireland.

To those who are acquainted with him it is no surprise that he took naturally to the platform. Not only in connection with the organisations with which he is associated have his efforts been exercised. He has established a considerable reputation for himself as an able lecturer. His first lecture was delivered in his native town, and he took as his subject 'Glimpses from the Rocks.'

This was the beginning of a series of a like nature. His ability in this direction was recognised by the National Education Association, and he is now an honorary lecturer to that body.

Mr. Hicks is a firm believer in the necessity for the teacher to utilise his position as an educationist in order to mould public opinion on the great social questions of the day. His connection with parents, his contact with the future citizens of the realm, his education, and his general knowledge on public matters, combine to make the teacher a valuable and essential unit in the community which has the consideration of questions affecting the welfare of the nation.

Dealing with the future policy of the Union, Mr. Hicks expressed the hope that the present policy would be extended on broader lines, and that the members should be placed in such a position as to render their liability to unreasonable treatment absolutely impossible.

He recognises that national education is at present passing through a somewhat serious crisis, and hence there is a greater necessity for true unionism.

Anyone who is honoured with the privilege of having an hour's conversation with Mr. Hicks on educational matters cannot fail to be impressed with the broad and ready grasp which he possesses of intricate details. His lofty ideal of his profession, too, is a pleasing feature of his character. His ability as a literary man is conspicuous, and is well known to those who peruse the scholastic journals.

The time is drawing near when many of the 'veterans' who have long and faithfully watched over the interests of the profession must of necessity seek their well-earned retirement. When that time arrives, the places will be filled by those whose youthful vigour and ability entitles them to succeed. Not very far down in the line of succession we shall find Mr. Hicks.

His general culture, his varied experience in educational work, his knowledge of teachers' questions generally, together with his legal training (for it is interesting to note that he is a law student of The Inner Temple) will, in the future, very materially assist him in his endeavour to discharge, thoroughly and efficiently, the honourable trust reposed in him by his fellow teachers.

We cannot yet picture him as a 'patriarch.' We hope to secure many years of his service for the cause before that description will be applicable. We know, however, that his labours up to date have been of such a nature as to impress us with implicit confidence in his ability to go forward.

The respect in which he is held by his colleagues, and the position he has established in his profession, are indeed most creditable. With a promising future before him, he could not be placed in any category more fitting than that of 'Coming Men.'

LEGAL AND CODE QUERIES COLUMN.

RULES.

1. All communications must be addressed 'Legal Editor, PRACTICAL TEACHER, Froebel House, St. Andrew's Hill, Doctors' Commons, E.C.,' and must be accompanied by our 'coupon,' duly filled up.
2. Replies will be given *only* in this column, except under the conditions named in Rule 3.
3. If any reader desires a reply by post, such can be forwarded by enclosing, in addition to the

coupon, a stamped addressed envelope and either stamps or a Postal Order to the value of one shilling.

4. No original documents should be forwarded, but copies only. We cannot hold ourselves responsible for any losses which occur through non-observance of this rule.

Certificate Examination.—'W.E.D.'—(1) 'Selections from Tennyson,' Parts 1 and 2, is the English subject. (2) In English History the period set is 1760–1820. (3) I do not see why you need obtain another post in order to obtain permission to sit at the July Examination. (4) One month. (5) If you obtain a copy of the N.U.T. Code, you will find on page 289 the full Certificate Syllabus.

Scholarship Examination.—'IGNORAMUS.'—(1) You will be awarded marks for *one* Science Certificate only. (2) The number of marks given for an Advanced First is '60,' for an Advanced Second '50.' (3) Write to the Secretary, Science and Art Department, South Kensington, S.W., asking for the name of the local secretary for the Science Examinations, or if there is a Science and Art School in your town, one of its officials will no doubt give you this information.

Husband's Liability for Debts incurred by Wife.—'RECKLESS.'—To state the law fully would require columns. The main principles are:—(1) The law presumes that when a man and his wife live together, she has been authorised by him to pledge his credit for necessaries in the way of food and clothing for herself and the family. (2) In order to rebut this presumption, it must be shown that the husband has given direct instructions to the contrary. (3) With reference to goods supplied on credit to a wife which cannot be considered as necessaries, the husband is not liable for the debt. As to what *are* and what *are not* 'necessaries,' each case is dealt with on its merits. For instance, in your case, no court would order you to pay for a £100 seal-skin jacket supplied by a tradesman on credit to your wife, nor would it order you to pay £10 for a dozen of champagne.

Contract.—'ASSISTANT MISTRESS.'—Without having information as to the exact form of agreement or order which you have signed, I cannot give a definite opinion. If, however, your signature to the document was obtained either by fraud or by misrepresentation, the conditions contained in the document cannot be enforced against you, even although the document be binding so far as its mere form is concerned.

Drawing Examination Schedules.—'M.G.'—The following official letter of the Science and Art Department answers your query:—'In reply to your letter of the 9th inst., I am directed to state that it is no longer necessary to state in Column iii. of Form 1294 D, the reason for re-presenting any scholar in the same Standard as last year, but that Columns ii. and Va of that Form should be filled up by the managers as heretofore.' (Note:—'Form 1294 D' is the Drawing Schedule.)

Average Salary.—'DOUBTFUL.'—Yes; the average salary has increased, but not to such an extent as is generally supposed. The number of teachers with very low salaries has certainly decreased considerably, but the large influx of new teachers at about the average rate keeps down the general average. The following table gives the exact figures for 1883 and 1893.

Salaries.	Number.			
	Men.		Women.	
	1883.	1893.	1883.	1893.
Under £50 - -	227	151	4293	3071
Betwn. £50 & £75	2134	2586	9088	12324
Over £75 - -	12466	16295	7889	12550
Totals - -	14827	19032	21270	27945
Average Salary -	£119 0. 0.	£121 15. 2.	£72 1. 9.	£79 4. 0.

Use of Schoolroom.—'MINUS LEX.'—The rating of the building is not affected by the fact you name.

Special Drawing Certificate.—'R.L.T.'—(1) These certificates will be granted to those who fulfil the conditions *and* make application prior to 31st December 1896. (2) They are granted to those who 'have been recognised by the Education Department as teachers of elementary schools for at least seven years previous to 1st September 1891, when drawing was made a compulsory subject of instruction for all boys in schools for older scholars; and (3) they must present a certificate, if required by the Department, from the managers of the schools in which they were taught drawing, that the instruction in that subject was given by them regularly throughout the period in which the schools obtained the requisite reports.'

Scholarship Examination.—'LUCY.'—The marks will be credited to you among those given at the examination just over.

Parish Councils Act.—'CHAIRMAN.'—The point you raise is not dealt with in the Statute, but the Local Government Board have ruled that the chairmen now elected remain in office *only* until March next, when another election must take place. It appears absurd, but such is the ruling, which cannot be effectively questioned.

CORRESPONDENCE.

***We shall be pleased to reply briefly through these columns to any* SUBSCRIBER *seeking examinational information or advice, and* Enclosing the Necessary Coupon.**

***This privilege does not, of course, extend to furnishing the solutions and answers of problems. All such communications should be addressed to* 'THE QUERY EDITOR.'**

***Replies demanding urgency will be promptly forwarded per post on the receipt of a stamped and addressed envelope,* Accompanied by the Requisite Coupon.**

R.H. (Saltburn).—Your examination 'permit' will give all requisite information.

W.W.P. (New Ferry).—See scheme of Executive of N.U.T. involving imperial aid.

'JEX' (——).—Before Managers can expel, the child must have become a positive nuisance to the other scholars. There is a controversy still raging on this point between the Department and Aston School Board.

'METHODIST' (Langley).—Our own opinion is that all P.T.'s should be paid direct from Whitehall.

H.M. (Hemingsdale).—You will be able to sit at Midsummer next.

W.C. (Cardiff).—'Too late, ye cannot enter now.'

R.S.V.P. (Southwark).—Mellin's, Stafford Street, Peckham, will forward some excellent tables of milk constituents.

A.N. (Stourport).—Let $x = vx$, and the value of v is obtained and then that of x.

'H.M.I.A.' (M'field).—He has not the slightest right to interfere with the devotional exercises of the school conducted according to the routine.

'CARRIE' (Preston).—There is no such a mood as 'The Potential.' *Can* is an indeterminate verb governing a 'prolative' infinitive.

ANSWERED PER ORDINARY LETTER.—W.V. (Bacup); A.McK. (Machrimore Mill); J.F. (Heaton Norris); C.F. (Ipswich); R.G.E.H. (Knaresboro); E.H. (Swindon); M.H. (Beverley); A.P.J. (Jarrow); J.F.B. (Brighton); T.H. (Highmoor); T.F. (Stafford); J.S. (Preston); W.H. (Crewe); 'ICH DANKE IHNEN' (Linlithgow); J.W.W. (Eckington); H.G. (Tipton); J.J. (Clayton-le-Moors); C.W. (Flint); A.D. (Dacre Park); P.J. (Dalmally); T.H.B. (Pannal); S.S. (Brigsworth); J.J. (Ashbourne); J.J.B. (Devonport); T.M.P. (Hanley); W.O.K. (Old Newton); H.J. (Gainsboro'); F.H.B. (Pannal); J.C. (Warrington); C.W. (Glynnar); T.J. (Pelton Fell); A.C. (Ellaston); M.T.J. (Morecambe); W.S. (Hucknall); P.P.R. (Aston); 'TONY' (Leicester); 'STO' (Market Rasen).

MODEL ANSWERS TO SCHOLARSHIP QUESTIONS.

JULY 1894.

HISTORY.

1. Why may the accessions of (*a*) William I., (*b*) Henry VII., (*c*) James I., (*d*) William III., and (*e*) George I., be said to begin *fresh* periods of English History? Narrate briefly the events immediately preceding each.

(*a*) *William I.* (1066–1087) introduced the Norman dynasty and supremacy, developed the Feudal system, and changed the whole current of national life. He visited England in 1052, when the Confessor foolishly promised him the Crown. Subsequently Harold by means of shipwreck fell into William's hands, who most ungenerously forced him to swear to uphold his claim.

Nevertheless, upon Edward's death, the Witan elected Harold in January 1066. In September, Harold decisively defeated and slew his brother Tostig and King Hardrada of Norway at Stamford Bridge, but a fortnight later was himself overthrown and killed at Hastings.

(*b*) *Henry VII.* (1485–1509) by his victory at Bosworth closed the sanguinary Wars of the Roses, and introduced the era of despotic power.

Richard III. had disgusted many of his supporters, and an agreement between many Yorkists and Lancastrians resulted in Henry landing at Milford Haven in August 1485. Supported by the Welsh he advanced to Shropshire, where he was joined by the Talbots, and proceeding to Leicestershire, *en route* to London, he defeated and slew Richard, mainly through the inaction of Lord Stanley.

(*c*) The union of England and Scotland under one monarch (not yet as one country) dates from *James I.* (1603–1625). Before Elizabeth's death he had been recognised as heir apparent, and indeed there was no opposition to his accession. The most noteworthy events immediately precedent were Founding of East India Co. (1600), Execution of Essex (1601), Poor Law (1601). The influence of Puritanism was becoming a great political force.

(*d*) *William III.* (1689–1702) was in the modern sense our first 'limited' monarch. James II. had by his unconstitutional claims to suspending and dispensing powers, etc., by his arbitrary acts, with the universities and seven bishops, etc., and by his cruelties in the 'Bloody Assizes,' etc., alienated the nation.

William, landing at Torbay, reached London unopposed, whilst James escaped to France. The Convention Parliament in 1689 passed the Declaration of Rights, and declared William and Mary, King and Queen.

(*e*) *George I.* (1714–1727), as Elector of Hanover, embroiled us in many continental disputes. He owed his throne to the exertions of the Whigs, who, by virtue of the existing laws and officials, overpowered and outmanœuvred the Tories and High Church party. These latter had for some years predominated, and were (as was Anne) in favour of the Queen's brother, James, the Old Pretender.

2. What were the general objects of the following?—

(*a*) *Salisbury Decree* (1086). William caused all free-holders to take the oath of fealty to him personally, and not merely to their mesne lords. This broke the power of the tenants-in-chief.

(*b*) *Constitutions of Clarendon* (1164) established the Supremacy of the State Courts alike over laity and clergy. The usurpations of the four preceding monarchs had rendered them somewhat dependent upon the Church, which had seized the opportunity to emancipate itself from secular control.

(*c*) *Magna Charta* (1215) forbade pecuniary exactions, and the selling, delaying, or refusing of justice. It asserted the right of judgment by one's peers, the freedom of commerce, and enacted that there should be a fixed standard of weights and measures and that the Court of Common Pleas should be stationary at Westminster.

(*d*) *De Religiosis or Mortmain* (1279 and 1391) was a Statute forbidding property to be made over to the Church without the King's consent.

(*e*) *Statute of Labourers* (1349 and 1351). The first fixed the wages of ordinary agricultural labourers at 1d., reapers 2d., mowers 3d. per day. The second forbade men to leave their parishes in search of work. The Black Death had made labour scarce, and wages had risen above the aforementioned ordinary rates.

(*f*) *Statute of Kilkenny*, passed by Irish Parliament in 1366, forbade the English Colonists to intermarry with the Irish, or to adopt their language, customs and laws. They were becoming 'Hiberniores quam Hibernis.'

(*g*) *Statute of Supremacy* (1534 and 1559) declared the Sovereign head of the Established Church, and that 'no foreign prince or potentate had any authority in this realm.'

(*h*) *Act of Uniformity* (1549, 1559, 1662) enforced the use of the 'Book of Common Prayer.' Clergymen were to receive episcopal ordination, take the oath of Non-Resistance, and abjure the Covenant.

(*i*) *Corporation Act* (1661) attacked the position of Dissenters in towns, by providing that corporate officials should take the Lord's Supper according to the rites of the English Church, should swear Non-Resistance, and abjure the Covenant.

(*j*) *Act of Settlement* (1689 and 1701). The first settled the Crown on William III., Mary II., and their children, in default of issue to Anne: the second, failing the other provisions, on Sophia of Hanover and her heirs.

(*k*) *Triennial Act* (1641) ensured an appeal to the country at least once in every three years.

(*l*) *Septennial Act* (1716) extended the possible duration of Parliament to seven years. Three years had been found too short a period, and the unsettled state of the country rendered a dissolution inadvisable.

(*m*) *Factory Acts* (1833, 1847, etc.) limited the hours of women and children working in factories, and imposed certain obligations as to the education of those under 13 years.

3. Trace the relations between England and Scotland at the following epochs: (*a*) Edward I. to Edward III., (*b*) Henry VIII., (*c*) Elizabeth, (*d*) Charles I., (*e*) Anne, (*f*) George II.

(*a*) *Edward I. to Edward III.* (1272 to 1327). Upon the death of the 'Maid of Norway,' Edward, being called in to adjudicate respecting the numerous claims to the throne, decided upon Baliol, who was accordingly elected. But Edward forced upon him vassalage, and with numerous oppressions so goaded him as to cause him to revolt. This was used as a pretext for an English conquest, and Edward overran and for a time subdued the country. The flames of resistance were however kept alight by Wallace, and after his death by Robert Bruce, until Edward II.'s accession (1307). He at once showed his weakness by abandoning the Scotch war and concluding a truce with Bruce. For the next seven years the truce was continually being broken by the Scotch, and all the English garrisons except that of Stirling had surrendered by 1314.

To relieve this fortress an enormous English army marched to Bannockburn, but was decisively defeated, and Scotch independence hereafter secured.

(*b*) *Henry VIII.* (1509 to 1547). James IV. of Scotland had married Henry's sister Margaret, but her dowry was unjustly withheld. Accordingly, when England was embroiled with France, James invaded England, only to be defeated with immense loss and slain at Flodden (1513). Later on James V. of Scotland married a French wife, and hostilities again ensued, the English sustaining a reverse at Haydon Rigg (1542), but utterly routing the Scots at Solway Moss in the same year.

(*c*) *Elizabeth* (1558 to 1603). Many even of the English believed Elizabeth to be illegitimate, and Mary Queen of Scots to be rightful monarch. Accordingly Elizabeth retaliated by attacking her rival's power in Scotland, and supporting the Protestant rebels with ships, troops, and money. At Leith (1560), Carberry Hill (1567), and Langside (1568), the Royalists were defeated, and Mary fled to England, where she was imprisoned for 19 years, until her decapitation in 1587. Her son and successor, James VI., talked largely of revenge, but was easily silenced by a few fair words, paltry distinctions, and a pension.

(*d*) *Charles I.* (1625 to 1649). In 1637 Laud unsuccessfully attempted to force upon the Scotch Presbyterians the English Liturgy, and the National Covenant was signed. Charles invaded Scotland, but was defeated at Newburn, and lost Newcastle and Durham to the Scots. He was therefore obliged to give way. Upon the outbreak of the Civil War the Scots sided with the Parliament, and in 1644 sent 40,000 men to its aid, who materially assisted at Marston Moor. The Highlanders, however, under Montrose, won the battles of Tippermuir, Alford, and Kilsyth, but were finally defeated at Philiphaugh. In 1646 Charles surrendered to the Scots, who handed him over to the Parliament for £400,000.

(*e*) *Anne* (1702 to 1714). At the commencement of this reign commercial rivalry almost resulted in the separation of the two countries, and in 1703 the Scotch passed the 'Act of Security,' preventing the union of the crowns of England and Scotland except upon certain conditions. The following year another Act excluded by implication the House of Hanover from the Scottish throne. In 1705 various stringent measures against Scotch trade were passed by the English Parliament, but in 1707 full legislative Union between the two countries was established and commercial friction minimised. Scotch trade immediately commenced to grow by leaps and bounds.

(*f*) *George II.* (1727 to 1760). In 1736 occurred the 'Porteous Riots,' which engendered much ill-feeling against England. In 1745 the 'Young Pretender' landed at Moidart in Inverness, and rallied around him the Highlanders and the Southern Jacobites. He won several battles and marched as far south as Derby, but, being compelled to retreat, was defeated at Culloden in Invernessshire (1746). The embers of the rebellion were extinguished with the utmost severity.

So great was the Hanoverian fright, that roads were subsequently cut through the Highlands, forts built, and the clans thoroughly bridled.

4. State briefly what you know of (i) any three of these persons :—(*a*) Monk, (*b*) Marlborough, (*c*) Chatham, (*d*) Warren Hastings, (*e*) Lord John Russell, and (*f*) John Bright. (ii) (*a*) Year 1759, (*b*) the Chartists, (*c*) Crimean War, (*d*) Indian Mutiny, (*e*) Cotton Famine in Lancashire.

(i) (*a*) *George Monk* (1608 to 1670) was at first a Royalist, and was made prisoner by the Parliament at Nantwich (1644). Five years later he consented to serve his captors, and was made commander of the artillery. After serving as an admiral against the Dutch, he governed Scotland from 1654 to 1660. He then brought about the Restoration by marching to London and declaring for a free Parliament. For this he obtained the Dukedom of Albermarle, the Garter, a pension, and command of the fleet. In this latter capacity he gained considerable renown against De Ruyter in 1666.

(*b*) *John Churchill* (1650 to 1722) was a favourite of Charles II. and James II. By the first he was created a Scotch, and by the second an English, peer. He joined the Prince of Orange in 1688, in 1690 was made Earl of Marlborough, but was imprisoned in the Tower from 1692 to 1694. In the War of Spanish Succession he won battles of Blenheim (1704) (which gave him a Dukedom), Ramilies (1706), Oudenarde (1708), Malplaquet (1709), etc. Accused of peculation, he was in 1711 deprived of his command, and he remained on the continent until the accession of George I.

(*c*) *William Pitt*, 'the Great Commoner' (1708 to 1788), was the son of 'Diamond' Pitt. Educated at Eton, he entered Parliament as M.P. for Old Sarum in 1734, and soon became a bitter opponent of Walpole.

In 1739 he voiced the public feeling against Spain in the matter of 'Jenkins' ear.' Seven years later he became Paymaster of the Forces and in 1757 a Secretary of State, and practically Prime Minister. He resigned office in 1761 and was granted a pension of £3,000. He again formed a ministry in 1766, and was made Earl of Chatham, but retired in 1768 on account of failing health.

From 1775 to 1777 he strongly advocated the claims of the American Colonists.

He was seized with his fatal illness whilst addressing the House of Lords.

(*d*) *Warren Hastings* (1733 to 1818) served as a 'writer' in India from 1750 to 1764. Five years subsequently he returned to India, and became Governor-General in 1773. Although hampered by formidable enemies in his Council and by greed and rapacity at home, he won power and dominion on every hand and thoroughly established our Indian Empire. He remained in office until 1785, and, returning home, was impeached, but after a seven years' trial was acquitted (1795), and received a pension from the East India Company of £4,000.

He was a great man, far too unscrupulous, but as good as his employers, his accusers, and his age.

(*e*) *Lord John Russell* (1792 to 1878) was a younger son of the Duke of Bedford. When only 21 years of age he entered Parliament, and soon became known as an advocate of religious toleration and political and commercial freedom. In 1828 he moved the Repeal of the Test and Corporation Acts, and entered the Cabinet in 1830. In 1832 he passed the Great Reform Bill. He was Home Secretary from 1835 to 1841, but in the Opposition until 1846. In 1865, 1866, he was again Premier, but resigned leadership of Liberal party in 1868.

(*f*) *John Bright*, 'the People's Tribune,' was the son of a Rochdale manufacturer. He belonged to the 'Manchester School' of political economy, and was a staunch opponent of protection of any kind. He advocated the repeal of the Corn Laws and Free Trade in general. As a Quaker he strenuously resisted the Crimean War, and was ousted from his Manchester seat, but immediately was chosen a member for Birmingham, which city he represented till his death. In 1886 he regretfully severed himself from Mr. Gladstone on the 'Home Rule' Question.

(ii) (*a*) *The Year* 1759, 'the most glorious year that England has ever seen.' Everywhere success attended our arms. At Minden the French were defeated and the French designs on Hanover frustrated. At Havre much shipping intended for the invasion of England was destroyed by Rodney, whilst Boscawen at Lagos dispersed the French Toulon fleet with great loss. At Quiberon Bay Hawke utterly defeated the French and penned them in the Breton rivers. In America Wolfe won the battle of Quebec, which secured to England the whole of Canada.

(*b*) *The Chartists* were extremists who were dissatisfied with the Reform Bill of '32. They desired (1) Manhood Suffrage, (2) Equal electoral districts, (3) Vote by ballot, (4) Annual Parliament, (5) Payment of Members of Parliament, (6) Abolition of property qualifications for Members of Parliament. Several of these points have been since conceded as time and occasion permitted. In 1838 riots commenced, and were fomented until, in 1848, the Chartists proposed to march in procession to 'The House' and terrorise the members. Special precautions were taken, but the proposed demonstration turned out a fiasco, and Chartism dwindled gradually away.

(*c*) *The Crimean War* (1845 to 1856) was fought to repel Russian encroachments upon Turkey. England, France, and Sardinia aided the Ottoman Power, and invaded the Crimea, where we won the battles of Alma, Balaclava, and Inkerman, and besieged Sebastopol. Our troops suffered frightfully from exposure, want, and sickness, whilst affairs were outrageously mismanaged. After a year's investment, Sebastapol was evacuated and the Treaty of Paris signed. The campaign cost us upwards of 25,000 lives and £40,000,000 in money, and as far as lasting results are concerned was utterly abortive.

(*d*) *The Indian Mutiny broke out in* 1857, on 10th May, at Meerut, 40 miles N.E. of Delhi, and in six weeks 50,000 native soldiers were in arms against us. The armies of Madras and Bombay were faithful, and Sir John Lawrence kept the recently-annexed Punjaub pacified.

At Delhi, the descendant of the Great Mogul was installed 'Emperor of India'; at Cawnpore and elsewhere were frightful massacres of Europeans, neither age nor sex being spared; and at Lucknow the English were defeated and closely besieged in 'The Residency.' Numberless deeds of heroic valour shone forth, and gradually British bravery, skill, and endurance

asserted their supremacy. Delhi was recaptured, Lucknow twice relieved, the insurgents defeated in countless battles, and the rebellion finally quelled by the end of 1858. The names of Sir Colin Campbell (Lord Clyde), Sir Henry Havelock, Sir James Outram, and Sir Henry Lawrence remain worthy of everlasting remembrance.

The causes of the mutiny were many: (1) A prophecy as to the termination of our rule 100 years after Plassey (1757), (2) Intrigues among the native princes, (3) Needless disregard of native religious prejudices, and (4) Incompetence of some of our officials.

The chief result was the transference of the administration from the Company to the Crown.

(*c*) *Cotton famine in Lancashire* (1862 to 1865) was the result of the lack of raw cotton owing to the Civil War in America. The operatives of Lancashire and North-East Cheshire were in consequence thrown out of work, and thousands of people were on the verge of starvation. The inevitable suffering was endured with heroic fortitude, the national pity and conscience was awakened, relief funds were liberally raised throughout the land, and the war ending in '65, cotton was once more obtainable, and the famine ceased.

5. What were the grievances of the people and Parliament against Charles I. (*a*) during the first four years of his government with Parliament, and (*b*) during the next eleven without Parliament? (*c*) Describe the steps taken by the Long Parliament to remedy them, (*d*) '*The grievances which we bore from the Tudors and vindicated on the Stuarts*': which were these, and why were they contentedly borne from the Tudors?

(*a*) (1625 to 1629.) (1) King's marriage with a foreigner and a papist (1625); (2) English ships lent against the Huguenots (1625); (3) Forced general loan (1626); (4) Imprisonment of Members without trial (1626); (5) Illegal levying of tunnage and poundage (1626); (6) Ill-advised military operations (1627); (7) Soldiers billeted on private householders (1627); (8) Corruption of popular leaders such as Wentworth and Littleton (1628); (9) Dissolution of Parliament and imprisonment of Sir I. Eliot, etc. (1629).

(*b*) (1629 to 1640.) (1) Oppression by Council of North, Court of Star Chamber, Court of High Commission; (2) Persecution of Dissenters; (3) Suppression of freedom of speech; (4) Enforcement of monopolies, benevolences, etc.; (5) Policy of 'Thorough'; (6) Imposition of Ship-Money; (7) Attempted imposition of a Liturgy upon the Scotch; (8) Miscarriage of justice under royal influence.

(*c*) (1) The Parliament granted tunnage and poundage for only one year, and proceeded to impeach Buckingham (1625).

(2) It drew up the Petition of Right, and again impeached Buckingham (1628).

(3) It declared all who submitted to royal exactions 'enemies to the Commonwealth' (1629).

(4) It discussed all Charles' illegal proceedings (1640).

(5) It impeached Strafford and Laud (1640).

(6) It abolished Courts of Star Chamber and High Commission (1640).

(7) It declared Parliament should not be dissolved without its own consent (1640).

(*d*) The Tudors, on account of the decay of the nobility, the anxiety of the country for peace, the spread of commerce, and the religious divisions of the nations, were almost despotic.

They were allowed to alter and re-alter the national religion and the royal succession, to imprison and often execute at will, to confiscate the property of religious houses, to impose monopolies, fines, etc., and even to intimidate Parliament.

These evils were borne on account of the benefit of a firm government, the absence of trusted popular leaders, the personal popularity of the sovereign, the tactful acquiescence when necessary, and the absence of a policy of deceit.

6. (*a*) Show how (1) the coming of the Scots, and (2) the formation of the 'New Model' were the turning points in the Civil War. (*b*) Show the importance of (1) the relief of Gloucester, (2) the relief of Taunton, the battles of (3) Marston Moor, (4) Newbury, and (5) Naseby. (*c*) Explain carefully to what extent the Civil War was a war of classes or localities.

(*a*) (1) *The Coming of the Scots* in 1644 brought about the royalist defeat of Marston Moor, the surrender of York and Newcastle, and the total ruin of the king's power in the North.

(2) *The 'New Model'* (1645) was formed by the Self-Denying Ordinance which excluded all members of both Houses (except Cromwell) from military commands. Until this time the Parliamentary commanders had not appeared desirous of pushing Charles to extremities, and the soldiery had been ill disciplined and of poor morale.

Under the 'New Model' the officers were zealous, brave, and skilful, the soldiers fanatically religious, determined and disciplined, besides being regularly paid.

Previously the Royalists had been as successful as the Parliamentarians, afterwards they never won a battle.

(*b*) (1) In 1643 three Royalist armies were to converge on London. From the North the Earl of Newcastle, from the West the King and Prince Rupert, and from the Devonian Peninsula Sir Ralph Hopton were to advance to the Thames, and proceeding eastward to attack the metropolis. All at first seemed favourable, Newcastle defeated Fairfax, Hopton won Stratton, Landsdown, and Devizes; Bristol surrendered to Prince Rupert, and Charles sat down before Gloucester.

However, the London train-bands under Essex marched westward, relieved Gloucester, and destroyed the combination.

(2) After Naseby (1645) Fairfax raised the siege of Taunton, which was almost the only important place of the south-west still in the hands of the Parliament. Had Taunton fallen the Royalist cause would have probably rallied in the West.

(3) The importance of Marston Moor has already been explained under (*a* 1).

(4) The first battle of Newbury (1643) cleared the way for Essex to return to London with the 'train-bands' after relieving Gloucester. The second battle of Newbury was fought to cover London from the advance of Charles, who had already dispersed Essex's army. If the king had been successful London must have fallen.

(5) In 1645 Charles could only make head in the S.W. and S.E. Midlands, and a little in the N.W. His aim was again London, after relieving Oxford, which was besieged by Fairfax. The latter met the king and decisively defeated him at Naseby. This led, as before stated, to the relief of Taunton, etc. After this Charles had no formidable army left.

(*c*) In Scotland, broadly speaking, the Highlands were for Charles and the Lowlands furnished the army that supported the Parliament.

In England, cathedral cities, many county towns, the universities and the landed interest sided with the king, whilst commercial towns, the richer districts, and the metropolis, assisted the Parliament. The great strength of the Parliament lay geographically S.E. of a line drawn from Hull to Weymouth. As a rule the Keltic fringe was Royalist, but the people of Saxon descent were against Charles. The influence of the Church was exerted for, and that of Puritanism against, the king.

7. (*a*) Explain what were the differences between Presbyterians and Independents about religion and politics (1) before, (2) during, and (3) after the war.

(*b*) What was there in the character of Charles and in his action after the war which helped to lead to his death?

(*c*) Say what you know about the character and political principles of (1) Strafford and (2) Cromwell.

(*a*) (1) Between Presbyterians and Independents before the war there was no practical disagreement, but both sects were united in resistance to the King and Laud. Nevertheless the Independents objected to any attempt to establish Presbyterianism, and were avowedly more republican.

(2) During the war the Westminster Assembly of Divines decided in favour of Presbyterianism, but a considerable number headed by Oliver St. John, Sir Harry Vane, and Cromwell declared against organised interference with the independence of each congregation. Mainly through Cromwell's influence the army was Independent, whilst the Parliament was Presbyterian.

(3) After Naseby Charles sought to foster these differences and to gain his throne by deluding the Parliament. He offered to establish Presbyterianism provisionally for three years. In 1647 it was willing to agree to this, and meant to call in the Scotch, arm the train-bands, and eject the Independents. The latter now took a firmer stand for congregational independence, religious toleration, and republicanism, which ended in Pride's Purge, the execution of Charles, and the Protectorate.

(*b*) As a monarch Charles had been taught that 'faith need not be kept with subjects,' and so his whole public career is degraded by intrigue, deceit, and faithlessness. The capture of his state papers during the war showed that while negotiating with Parliament he was plotting to introduce French and Irish armies for its destruction. After the war, he seemed neither to realise his helplessness nor the folly of his previous duplicity.

On the one hand he attempted to cajole Cromwell and Ireton, whilst he assured others he would hang them. There was no reliance in him.

(c) (1) The political principles of Strafford were such as would conduce to his personal advancement. Although he may have distrusted the length to which the Parliament was proceeding, yet his change of front was nicely timed to his own advancement. As a Royalist he professed to believe in absolution and government by the strong hand. As a man he was passionate, yet crafty, thoughtful but at times licentious, and a yielder of the right to the expedient.

(2) Cromwell was a patriot of exalted motives and dauntless energy. He extricated the liberties of England from the grasp of royal prerogative, and saw more clearly the wisdom of religious tolerance, freedom of the press and of trade, than any of his contemporaries. His views were, however, moderate, and his republicanism was forced upon him by political exigency.

Restless under oppression, clear of conception, resistless in execution, unawed by danger, far-seeing in design, he executed his king, expelled his Parliament, subjugated Ireland and Scotland, bridled Royalist England, protected the foreign Protestant, liberated the Algerian slaves, humbled the Dutch and Spanish, and retained power until the day of his death with the support of but a fraction of his countrymen.

Every candidate should study the above answers, especially those relating to the reign of Charles I. These have purposely been dealt with in full detail.

A copy of Prof. Cusack's 'Reign of Charles I.' is before us. We can strongly recommend it. It is wisely planned, excellently executed, and indeed is essential to any Scholarship Candidate who wants maximum results with minimum toil.

REVIEWS.

Vere Foster's Standard Drawing Cards: Packets 1 to 17. London: Blackie and Son, Limited.

This issue of Drawing Cards will be found very suitable for use in elementary schools. Each packet contains eight cards, measuring about six inches by four inches, and having examples printed on both sides. A large proportion of the Freehand examples are well-drawn figures of common objects; but the series includes many designs of conventional ornament, both of the balanced and unbalanced kinds. Altogether they appear to be well adapted to meet the latest requirements of the Art Department.

Corea of To-Day. London: T. Nelson and Sons.

In this little book much information which will doubtless be found interesting at the present time is given in a very pleasant manner. It is mostly extracted from a larger work, 'Corea from its Capital,' by G. W. Gilmore, M.A., who writes from the practical experience gained by a two years' residence at Seoul. New matter has been added to bring the information up to date, and to help the reader to understand the origin of the present conflict between China and Japan.

The book is well printed on good paper, and it contains several illustrations from photographs by the author.

The Suggestive Dictation-Book: Part I. London: Blackie and Son, Limited.

This volume has been prepared to accompany the graduated series of 'Suggestive Word building and Spelling Books' recently issued by the publishers and favourably noticed in this journal. It provides some hundreds of dictation exercises carefully graduated and arranged so as to correspond exactly with the spelling lessons in the books for Standards II. and III. In the earlier exercises sentences have been constructed to introduce words as previously classified. In the later exercises well-chosen narratives are adapted to the same purpose.

We can recommend the book as affording an abundant supply of practice on what we regard as the only rational method of teaching English spelling to young children.

The Lances of Lynwood. By Charlotte M. Yonge. London: Macmillan and Co.

Following up their admirable school editions of Kingsley's novels founded on English history, Messrs. Macmillan have just published, in similar form, Miss Yonge's capital story 'The Lances of Lynwood.' The book provides a striking picture of the chivalric life of the fourteenth century, and its interest is well sustained from beginning to end. There is a short introduction to explain the position of affairs in relation to England and France at the time dealt with in the story. The abridgement has been very skilfully made, without any sacrifice of essential points of interest. The many archaic terms are suitably explained, and much helpful information is given in the notes appended to the chapters. As a reading book for the upper Standards, particularly in boys' schools, we can heartily recommend this volume. The binding, paper, and typography are well adapted for school use.

The School and Home Library: 1. Dana's Two Years before the Mast. 2. Southey's Life of Nelson. 3. Waterton's Wanderings. 4. Anson's Voyage round the World. 5. Lamb's Tales from Shakespeare. 6. Autobiography of Benjamin Franklin. 7. Scott's Talisman. 8. The Basket of Flowers. 9. Marryat's Masterman Ready. 10. Alcott's Little Women. London: Blackie and Son, Limited.

The goodly array of neatly-bound volumes now before us bears ample witness to a publishing enterprise which we regard as remarkably well-timed and well-judged. The existence of a national system of education for more than twenty years has undoubtedly raised up a vast number of young readers, and so created a demand for a suitable supply of books to satisfy their requirements. Good English literature is by no means lacking. What is especially desirable is that it may become readily available in a cheap and handy form. This desideratum is well met in Messrs. Blackie's new series. A glance at the list is enough to show that sound judgment has determined the selection. While the opening volumes exhibit great variety of subject, every one contains a standard work of genuine interest.

Care has been taken in editing, and where necessary abridging the works, to preserve the continuous interest, and to bring them within the limits which the special object in view prescribes. Some may be inclined to say that standard books ought never to be abridged; but with the constant increase in the number of new books, wise condensation of the older ones is the likeliest way to secure their extensive usefulness.

It seems only reasonable to suggest that several of these volumes may well serve a further purpose beyond the primary one of providing a good nucleus for a School and Home Library for young people. In size, form, and contents they are remarkably suitable for adoption as class reading books in the upper standards, both of elementary and higher schools.

The publishers have done their work well. The binding strikes us as being especially neat, and it gives promise of durability. We wish this venture all the success it deserves.

London University Guide and University Correspondence College Calendar. London: W. B. Clive.

The well-arranged guides of the U.C.C. are now so well known as to need little in the way of description. Of the present volume it must be said that it is a great improvement upon its predecessor in get-up and in arrangement—no slight praise this, as its predecessors have been models of lucidity and conciseness. To say that the guide is indispensable to all would-be London graduates is simply to pen a truism. It is we of the older school of graduates who can appreciate to the full the vast assistance rendered to the neophyte by the U.C.C., of which the volume under review is a sterling proof.

SIR ISAAC PITMAN & SONS' LIST.

Adopted by the London, Edinburgh, Nottingham, Bristol, Plymouth, and other School Boards.

THE AVON ENGLISH READERS.

Bold Type—New Readings—Un-Hackneyed Poetry.

LIST OF THE SERIES.

STANDARD I.	10d.	STANDARD IV.	1s. 3d.
,, II.	10d.	,, V.	1s. 4d.
,, III.	1s. 0d.	STANDARDS VI. and VII. ...	1s. 8d.

What the 'BOARD TEACHER' says:—

'These books are Readers, not scraps of spelling and grammatical exercises. The **matter is well chosen**; series of lessons in various subjects, **vigorous and wholesome**; **sterling poetry, good illustrations, strong binding**—all go to make the books a welcome addition to the long list extant. The publishers are to be congratulated on their new departure.'

OTHER READERS SHORTLY.

SIR ISAAC PITMAN & SONS,

1, Amen Corner, London, E.C.; and Bath and New York.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

TEACHERS' TRAINING DEPARTMENT FOR MEN AND WOMEN.

1. For Secondary Teachers. Recognised by the Cambridge Teachers' Training Syndicate.
2. Day Training College under the Education Department.

Principal—T. F. ROBERTS, M.A. (Oxon.)

LECTURER IN EDUCATION AND MASTER OF METHOD.
FOSTER WATSON, M.A. (Lond.)

ASSISTANT LECTURER IN EDUCATION & MISTRESS OF METHOD.
ANNA ROWLANDS, B.A. (Lond.)

MUSIC.
D. JENKINS, Mus. Bac. (Cantab.)

DRAWING.
J. CLARK (*Art Master, South Kensington Certificate*).

NEEDLEWORK.
Miss NICKLIN, *Certificated Mistress.*

A certain number of Exhibitions of £10 and £5 is confined to Normal Students.

The Women Students reside in the Hall of Residence for Women; the Men in registered lodgings in Aberystwyth.

The Government Grant is sufficient, with economy, to provide Board and Residence for the whole time that the student has to reside at Aberystwyth.

Applications should be made early, addressed to the undersigned, from whom Prospectus of the Arts and Science Departments of the College may be obtained, together with Special Prospectus of Day Training Department; also Syllabus of Training Department for Secondary Teachers, and all further information.

T. MORTIMER GREEN, Registrar.

CURWEN'S MUSICAL NOVELTIES.

SCHOOL MARCHES

BY

ELEMENTARY TEACHERS.

*** These Marches won the awards in J. Curwen & Sons' Competitions for School Teachers. They are pianoforte solos, and are suitable for dismission, assembly, musical drill, etc., in schools. The following teachers contribute to the volume:—

R. G. Thompson, Mus. Bac.
Geo. H. D. Yorke.
Sam Vallis.
Flora Keith.
John Brind.
George Grace.
Allen Banks.
Edwin C. R. Langley.
R. F. Thomas.
Edward L. Stubbs.
E. J. Labbett.
George Richmond.

In Staff Notation, price One Shilling.

THE BOHEMIAN GIRL.

AN OPERA.

By MICHAEL W. BALFE.

The words revised and re-written by A. J. Foxwell. The music selected and adapted for the use of schools, academies, and colleges, by H. Fisher, Mus. D. Cantab.

All the well-known airs and choruses are preserved, closely following the originals, with the advantage that the plot and the words, as well as the compass of the music, are such as may be sung in schools. Two-part choruses. Brief dialogue. Solos for Thaddeus, the Queen, the Count, and Arline. Parts for castanets, tambourine, and triangle included in the pianoforte edition.

Old Notation, 2s.; Tonic Sol-fa, 6d.

MOZART'S TWELFTH MASS.

ARRANGED FOR EQUAL VOICES

By CHARLES WEBB.

Old Notation, 2s. 6d. **Tonic Sol-fa, 9d.**

SONGS & GAMES FOR THE KINDERGARTEN.

Written by **LOUIS B. TISDALE.**

Music Composed by **E. OUSELEY GILBERT.**

Most of the games can be played without the songs, which, however, make the play more interesting. The songs range from very simple ones for the babies to more elaborate ones for the standard children. Full directions are given how to play each of the games.

Both Notations, also Pianoforte Accompaniment. Price 2s.

TONIC SOL-FA NOTE AND TIME TESTS.

By W. DOCKSEY

(*Superintendent of Singing to the Bradford School Board*).

A set of charts, sold separately, size 36 by 34 inches, printed on both sides, one side containing ten Note Exercises, and the other side ten Time Exercises. Each sheet is eyeletted on a cartridge marginal mount ready for hanging. The sheets are suited to the Divisions of the Code, as follows:—Sheet 1, Division II.; Sheet 2, Division III.; Sheet 3, Division IV. Sheet 4 is an extra sheet of ten combined Time and Tune Tests for Division IV.

Price 6d. each; 2s. per set.

FLOWERY GARLANDS;

An Action Song for School Concerts.

Words by **A. J. FOXWELL.**

Music by **C. HUTCHINS LEWIS.**

The children hold garlands of flowers wreathed round a length of wire, making arches, festoons, coupled with pretty grouping. Full song size. Both Notations.

Price One Shilling.

LONDON: J. CURWEN & SONS, 8 & 9, Warwick Lane, E.C.

The Principles and Practice of Teaching and Class Management. By Jos. Landon, F.G.S. London: Alfred M. Holden.

A book on teaching from the pen of the Vice-Principal of Saltley demands more than ordinary consideration by reason of the success of his former efforts in this direction. Let us at once hasten to say that the book is worthy of the man, being well adapted in every respect as a *vade mecum* for the teacher desirous of being at one and the same time up to date and scientific. The scope of the work has been fixed by the Government requirements for students in training; but so liberal has been the interpretation of these requirements, and so scholarly has been the spirit in which they have been met, that teachers out of the chrysalis stage will perhaps set a higher value upon Mr. Landon's work than will the students whose wants the book is so eminently qualified to supply. Mr. Landon's former work was described by Quick as 'an excellent book,' and has long been a classic for the L.L.A. of St. Andrew's (Education Section). It is, therefore, no slight praise to say, as we do from our intimate acquaintance with the two books, that the latter work is even more worthy than the former. An excellent feature of the book is the copious illustration of principles by quotations from the works of writers on pedagogics—English, American, and continental. By a judicious use of thick type, emphasis is laid upon the most important principles, and much assistance is rendered—to the student in revising his work prior to examination.

Chapter VI., on Teaching Devices, is the one that we found most interesting, the section on 'Questions' being especially good, their use and abuse being clearly pointed out and illustrated.

We refrain from quotation as we have marked so many titbits as to make a selection a most difficult matter, considering the exigencies of space. Besides, it is from a perusal of the book as a whole that the full benefit it can indubitably bestow will be obtained. It is a long time since such an excellent book on education has come under our notice. Of its ultimate success there can be only one opinion.

We had almost forgotten to add—and the omission would have been unpardonable—that printer and binder have done their best to make Mr. Landon's book as pleasing to the eye as an acquaintance with its contents will be to the mind.

PRIZE BOOKS.

MESSRS. CASSELL AND CO.'S LIST.

Cassell's Family Magazine Vol. for 1894.

Every member of the household may find entertainment in the pages of this capital Magazine. Messrs. Cassell evidently believe in progress, for the stories and pictures are better every year.

MESSRS. HUTCHINSON AND CO.'S LIST.

Miles Standard Elocutionist. By Lennox Browne, F.R.G.S., Clifford Harrison and Alfred H. Miles.

This most useful work is written by well-known specialists for each division of study,—the vocal organs, pitch, inflection, action, etc., etc. Three-fourths of the book is devoted to choice selections, in prose and verse, for elocutionists of all ages. The price is exceedingly moderate.

T. FISHER UNWIN'S LIST.

The Tragedy of the Norse Gods. By Ruth J. Pitt.

We have here classic myths presented to us in modern and popular style. Children will read these old world legends with avidity. A useful addition is made to the book by an explanatory index of names. The pictures are quaint and clever, and the volume is elegantly got up.

Venice. By Alethea Wiel.

This volume is a valuable addition to 'The Story of the Nations'' series. The history of Venice is as comprehensive as possible, and is written in pleasant readable style. It is most profusely illustrated, and is also provided with a very full reference index. The whole of this series are substantially and tastefully bound, and printed in beautifully clear type. Any one of the books is suitable for presentation.

MESSRS. BLACKIE AND SON'S LIST.

(SECOND NOTICE.)

A Prisoner of War. By G. Norway.

When the treaty of Amiens was broken and Bonaparte's soldiers swooped suddenly down upon the ports of France, Captain Wynter and family were living at Helvoetsluys. The captain was in charge of a mail packet then in harbour. So sudden was the attack that Wynter could only hasten the escape of his wife and family, and himself remain a prisoner of war. The main interest of the story, however, is in the return of Harry Wynter, a lad of 17, who is bent upon effecting his father's escape. The long and weary tramp through France in disguise, and all the clever stratagems which Harry had recourse to, in order to gain his purpose, is highly exciting. The success of the scheme, and final escape of father and son to England, completes a thrilling and touching little history, which has the great advantage of being true. The book certainly should have a place in the first rank of this season's gift-books.

Banshee Castle. By Rosa Mulholland.

This is the story of three orphan Irish girls. They, with an old friend, who is protector and chaperone in one, take possession of Banshee Castle, the home of their ancestors. Their income is extremely meagre, hence they live in curious stately poverty. The one relation they have in the world is the rightful owner of the castle. He unexpectedly arrives, and passing as their step-brother, gains their confidence, and learns their poverty. Complications arise when they discover the deception, and the castle is once more deserted. Eventually Dympna, the cleverest and strongest-minded of the trio, marries the owner of Banshee Castle, and all ends happily. The stories and legends of Irish folk-lore told by the peasantry are exceptionally interesting, and add another charm to this already delightful story. As a gift-book for elder girls nothing could be better than 'Banshee Castle.'

Olaf the Glorious. By Robert Leighton.

In 995 Olaf was king of Norway.' The story of his life and doings reads like a wild romance instead of the real historical fact which it is. He began life as a slave, and was in turn viking, Christian, and king. The incidents of Olaf's life are strung together and woven into a bewitching tale of ancient days. This beautiful book has our highest commendation in every sense.

Things Will Take a Turn. By Beatrice Harraden.

Very welcome is a new and revised edition of this charming little story. Some of the characters are indeed worthy of the pen of Dickens. We give Rosebud and her friends a hearty God-speed.

The Whispering Winds. By Mary H. Debenham.

A unique little volume of stories supposed to be told by the winds. They are all pretty fairy tales with good moral teaching underlying the surface of narrative. The cover of the book is exceptionally tasteful.

MESSRS. W. AND R. CHAMBERS' LIST.

(SECOND NOTICE.)

Thistle and Rose. By Amy Walton.

Anna Forrest and the history of her troubles should prove a useful study for young girls. Anna's difficulties arise through her giving way to petty deeds of deception and acts of selfishness. The story teaches how very quickly these little faults grow, and where the danger from them lies hidden. The tale is prettily told, and the volume is attractive in appearance.

MESSRS. MACMILLAN AND CO.'S LIST.

(SECOND NOTICE.)

Gulliver's Travels.

This is an artistic and dainty new edition of 'Gulliver,' profusely and delightfully illustrated by C. E. Brock. Utility, however, has not been sacrificed to art. The book will stand the wear and tear of everyday readers. A splendid gift-book.

MESSRS. NELSON AND SONS' LIST.

(SECOND NOTICE.)

Tuck-Up Tales. By Aunt Dweedy.

The name of this pretty little volume gives the idea of soothing good night stories for children; an idea fully realised in the fifteen tales which the book contains. These stories will be asked for over and over again by little listeners who are lucky enough to have an 'Aunt Dweedy.'

BRITISH MUSEUM 24 DE 94

DR. SMILES'S WORKS.

JOSIAH WEDGWOOD, F.R.S.: The great Artistic Potter. His Personal History. With Portrait. Crown 8vo. 6s. *[Just out.*

LIVES OF THE ENGINEERS. Illustrated with Nine Steel Portraits and 342 Engravings on Wood. 5 vols. 7s. 6d. each.

LIFE OF GEORGE STEPHENSON. With Illustrations. 21s.; 7s. 6d.; or 2s. 6d.

JAMES NASMYTH, ENGINEER. An Autobiography. Illustrated. 6s.

JASMIN: Barber, Poet, Philanthropist. 6s.

"Il rasait bien, il chantait mieux. . . . Si la France possédait dix poètes comme Jasmin, dix poètes de cette influence, elle n'aurait pas à craindre de révolutions."—*Sainte-Beuve.*

6s. each.

SELF-HELP.	**THRIFT.**
CHARACTER.	**DUTY.**
LIFE AND LABOUR.	**INVENTION & INDUSTRY.**
INDUSTRIAL BIOGRAPHY.	**SCOTCH NATURALIST.**

THE HUGUENOTS: Their Settlements, Churches, and Industries in England and Ireland. Crown 8vo. 7s. 6d.

ROBERT DICK: Geologist and Botanist. With Portrait etched by RAJON, and numerous Illustrations. Crown 8vo. 12s.

JOHN MURRAY, ALBEMARLE STREET.

Just Published. All Rights Reserved.

INTELLIGENT SPELLING.

(Conforming to the Requirements of Schedule I., New Code, 1894.)

NATURE'S METHOD *v.* MECHANICAL SPELLING.

Illustrative Sentences, word-picturing, and judicious exercises in word-grouping—also embodying the suggestions given in the Revised Instructions to H. M. Inspectors.

A RATIONAL AND DELIGHTFUL MODE OF ATTAINING, BY EASY STAGES,

A PRACTICAL KNOWLEDGE AND FLUENT USE OF THE MOTHER TONGUE.

Intelligent Spelling, Crown 8vo., 247 pp., complete, stiff paper back, **1s. 6d.**; strongly bound in cloth, **2s.** In Six Grades, **2d.** each. Instructions to Teachers, **1d.**

Full Catalogue of School Requisites Free by Post.

EDUCATIONAL UNION, 20, HARROW RD., LONDON, W.

(Near Edgware Road Station).

City House: 5, Paternoster Row, E.C.

CIVIL SERVICE EXAMINATIONS.

TUITION BY CORRESPONDENCE; Unique System; Numerous Recent Successes; 700 Passes. Prospectus free. *See*

KEEFE'S NEW CIVIL SERVICE MONTHLY

Considerably enlarged), issued on the First of the Month, post free 2½d., contains the Latest Information, Examination Papers, and other interesting news relating to the Civil Service. May be had from

J. KEEFE, F.R.G.S., 120, BOLD ST., LIVERPOOL.

L.L.A.

THE UNIVERSITY PREPARATORY INSTITUTE, 37, Chambers Street, Edinburgh, with strong Staff of Graduates, L.L.A.'s and Specialists, prepares Ladies thoroughly for this Degree in Two Sessions, at their own homes. System includes plans of study, with notes discriminating important and difficult points, exercises, weekly tests, solutions, model answers. Class, Open, and L.L.A. Prizes. 100 L.L.A. Successes in 1894. Moderate Fees. Students may enrol on or after August 20. The L.L.A. Guide for 1895, 1s.; the L.L.A. Prospectus, free. Address—The Secretary, as above.

THE STANDARD INK POWDER,

MANUFACTURED BY THE

MIDLAND EDUCATIONAL CO., LTD.,

Birmingham, Leicester, & Leamington.

This Powder is of remarkable strength, does not corrode the pen, and produces instantaneously a splendid Blue-Black Ink.

Half Gallon of good Ink for **6d.**, if by post, **8d.**
One Gallon do. **1s.**, do. **1s. 2½d.**
Two Gallons do. **2s.**, do. **2s. 3d.**

Trade Supplied. SAMPLE POST FREE.

GRIFFITH'S (Patent) BLACKBOARD ADJUSTER.

Adopted by the Birmingham School Board.

2s. 6d. Net.

Sole Wholesale Agents:
THE MIDLAND EDUCATIONAL CO., Ltd.,
BIRMINGHAM, LEICESTER, & LEAMINGTON.

GRATEFUL—COMFORTING.

EPPS'S COCOA.

BREAKFAST—SUPPER.

'By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected Cocoa, Mr. Epps has provided for our breakfast and supper a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame.'—*Civil Service Gazette.*

Made simply with boiling water or milk. Sold only in Packets, by Grocers, labelled thus:

JAMES EPPS & CO., Ltd., Homœopathic Chemists, London.

Makers of Epps's Cocoaine or Cocoa-Nib Extract: a thin beverage of full flavour with many beneficially taking the place of tea.

CHEAP.—Kolbe's Inorganic Chem. (8s. 6d.) (new), 3s.; Roscoe's Chem., 1s. 6d.; Thorpe's Quantitative Analysis, 1s. 9d.; Qualitative Anal. (Thorpe and Muir), 1s. 6d.; Elem. Chem. and Physiology (Pilley), 1s. each; Todhunter's Euclid, 1s.; Hydrostatics and Pneumatics (Magnus), 1s.; Barnard Smith's School Arith., 1s. 3d. All latest editions.—E. H. CARTER, Scarning, E. Dereham.

MANUAL of our Mother Tongue (Beach), 5s.; Locke's Thoughts on Education, 3s.; Spencer on Education, 1s. 6d.; Johnson's Lives of the Poets, 1s. 6d.; Theory of Music (Dutton), 1s. 3d.; The Study of Words (Trench), 3s. 3d.; Piper's Arithmetic, 2s.; Teaching Singing (Hullah), 1s. 6d.; Mason's Grammar, 1s. 6d.; Text Book of English History, by Osmund Airy, H.M.I., 3 vols., 1s. each; Ronge's Kinder Garten Guide, 3s. 3d.; Davies' History of the Stuart Period, 1s.; Short Essays, 1s. 6d.; Shakespeare's Plays of 'Hamlet,' 'Julius Cæsar,' 'As You Like it,' and 'Richard II.,' 9d. each; Durden's Life of Shakespeare, 9d.; School Management (Gladman), 1s. 6d.; Science and Art of Teaching (National Society), 3s. 3d.; Domestic Economy and Household Science (Mann), 2s. 6d.; Practical Hints for Infant School Teachers, 9d.; Musical Drill, Infants, by W. Wilson, 1s.; Jevon's Logic Primer, 9d.; The Earth and Solar System (Moffatt), 9d.; Physical Geography of Mountains and Rivers, 9d.; Geography of the British Empire, 1s.—Address, A. EVANS, 25, Scotland Street, Ellesmere, Salop.

MIDLAND CORRESPONDENCE CLASSES.

Government Inspectors, Principals of Colleges, Head Teachers, and Past and Present Students combine in recommending these Classes for sound and thorough work.

SCHOLARSHIP, 1895. CERTIFICATE, 1895.

SPLENDID COURSE OF PREPARATION IN ALL SUBJECTS.

ALL CLASSES CLOSE EARLY.

Students who intend joining for NEXT EXAMINATION should write for Prospectus at once.

FIVE METHODS OF PAYMENT TO SELECT FROM, INCLUDING NO PASS, NO PAY.

Full particulars post free. Organising Secretary, Cliff House, Ranmoor, Sheffield.

SUITABLE OCCUPATIONS, *Art. 85b and Cir. 332 (Inspec.)*

(STANDARDS 1, 2, & 3),

By GEORGE RICKS, B.Sc. (London),

Inspector of Schools under the School Board for London,

and JOSEPH VAUGHAN,

Art Master and Organising Teacher of Manual Training, London School Board,

NOW APPEAR IN THE

GIRLS' MISTRESS.

The above Course has been written in the form of ACTUAL LESSONS, showing the Teacher just what to do. The Illustrations are of such a character as has hitherto never been attempted by any Educational Paper. Specimens of work done sent to Subscribers, and

ALL QUERIES ON THE SUBJECT ANSWERED FREE.

*** Charming Stories and Plays for Infants are now appearing in the Infant Teachers' favourite paper, the INFANTS' MISTRESS. Price 1d. every week.

There is a steady increase week by week in the circulation of the GIRLS' MISTRESS and INFANTS' MISTRESS.

Order early. Price One Penny every week.

JOSEPH HUGHES & CO., FROEBEL HOUSE, ST. ANDREW'S HILL, DOCTORS' COMMONS, LONDON, E.C.

For 1895.

WILSON'S
THREE R.'s TEST CARDS

For Standards II. to VII. Price **1s.** *per packet.*

SPECIMEN OF STANDARD III. CARD.

ARITHMETIC.

Standard III. **Card 10.**

WILSON'S THREE R.'s TEST CARDS.

BOYS.

(1) Tom has 15*s.* 6*d.*, John has half as much. How much less than £2 have they together?

(2) Take £19 0*s.* 7½*d.* from £500 17*s.* 0¼*d.*

(3) Divide five million six hundred thousand and nine by one hundred and nineteen.

(4) Divide nineteen times 5,676 by ten thousand.

GIRLS.

(1) If a girl had 300 halfpenny buns and sold half, how much money would she get?

(2) Jane saved 8*s.* 6½*d.*, Polly saved 2*s.* 6*d.* more than Jane. How much had they together?

(3) Take £7,057 15*s.* 3¼*d.* from £98,007 17*s.* 8*d.*

(4) Divide one hundred and seventeen thousand and eighty-five by eighty-four.

JOSEPH HUGHES & Co., St. Andrew's Hill, Doctors' Commons, E.C.

Standard III. **Card 10.**

WILSON'S

THREE R.'s TEST CARDS.

READING or DICTATION.

A.

'But she must go at onoe from me—not come near me. Send her away quick! Every moment that she breathes the same air as me exposes her to danger. Only,' she added, in a lower tone, 'tell nurse not to frighten her about me or to put any fancies into her head—let her say I will meet her in the garden.'

B.

I said to him I had not got fifteen—eleven and ninepence was everything I possessed, and at last, in my eagerness, I nearly burst into tears. I really do not know if the old man was sorry for me, or if he only thought of getting my money; however that may have been, he took my purse out of my hand and slowly counted out the money.

JOSEPH HUGHES & Co., St. Andrew's Hill, Doctors' Commons, E.C.

☞ **A Specimen SET (all Standards) sent POST FREE for 4s.**

ADVANTAGES.

1. These Cards contain :—
   On one side—Arithmetical Tests for BOYS.
   " " GIRLS.
   On the other side—'UNSEEN' Tests in READING.
   " " DICTATION.
2. There are 36 Cards in each Packet, with Answers and **A BOOK CONTAINING ALL THE 'UNSEEN' READING AND DICTATION EXERCISES.**
3. The Arithmetical Examples are fully **UP TO DATE,** and embrace many of the Exercises most recently given.
   75 per cent. are H.M.I. actual Tests,
   and the remaining 25 per cent. are variations of these.
4. The Answers are **CORRECT,** and may therefore be relied upon.
5. The 'Unseen' Exercises in Reading and Dictation have been most carefully selected, many of them being actual Extracts given by H.M.I.
6. The Teacher will have all the Exercises together in a small BOOK given away with each packet.

THE ORDINARY DIFFICULTY IN EXAMINING CHILDREN IN 'UNSEEN' READING WILL THEREFORE BE OVERCOME.

Price 1s. per Packet. The Cheapest Cards ever Published.

☞ SPECIMEN SET SENT POST FREE TO ANY TEACHER FOR **4s.**

JOSEPH HUGHES & CO., Froebel House, Doctors' Commons, London, E.C.

GREGORY'S GEOGRAPHICAL WORKS.

Crown 8vo., 420 pp. NEW AND ENLARGED EDITION (SIXTH). **Price 2s. 6d.**

INCOMPARABLY THE BEST ELEMENTARY PHYSIOGRAPHY EVER PUBLISHED.

ELEMENTARY PHYSIOGRAPHY,

WITH NUMEROUS ORIGINAL ILLUSTRATIONS.

By R. A. GREGORY,

Oxford University Extension Lecturer; Honours Medallist in Physiography; Formerly Computor to Solar Physics Committee, The Royal College of Science, South Kensington; Fellow of the Royal Astronomical Society; Foreign Correspondent of the 'Revue Générale des Sciences.'

UNSOLICITED TESTIMONY OF EXPERTS.

J. BANNISTER, Esq., Stepney Pupil Teachers' School, Trafalgar Square, E., writes:—'We like the book very much and intend to use it at once. Please send thirty-two copies.'

J. W. SMITH, Esq., B.A. (Lond.), Central Higher Grade School, Hull, writes:—'I am delighted with the book, and have at once introduced it here.'

Miss E. J. CLAYDEN, P.T.'s Central Classes, Simms Cross, Widnes:—"Gregory's Physiography" is simply splendid, and I intend it to supersede the ordinary "Physical Geography" in use in my classes.'

A. HARVEY SMITH, Esq., Wesleyan Higher Grade School, Hanley, writes:—'I consider it is most admirable and thorough. It is certainly a more complete manual than any I have previously seen on the subject.'

D. RENTON, Esq., School-house, Macduff, writes:—I have now carefully examined the Physiography, and have no hesitation in saying that it is one of the best books on the subject that I know.'

ARTHUR WHEATLEY, Esq., B.A., B.Sc., Lecturer on Physiography, Technical College, Bradford, writes:—'The best I have seen. I shall recommend it.'

THOS. HUDSON, Esq., Rodley Board School, Leeds, writes:—'As a teacher of Physiography for many years I hail with pleasure the publication of such a work at so small a price.'

ALEX. ANSELL, Esq., Lecturer on Physiography, Sowerby Bridge:—'The best in the market undoubtedly, and I shall introduce it.'

F. TROUT, Esq., Ch. Ch. Boys' School, Newark, writes:—'Consider it an excellent book. It is a little singular that this very evening I received a note from a friend of mine who teaches Physiography at the University College, Nottingham, mentioning this same book, and recommending me to adopt it. I shall certainly adopt it.'

A LONDON SCIENCE WRITER AND LECTURER says:—'Gregory's book on Physiography is truly excellent, and meets all the wants of the student in a thoroughly workmanlike way.'

JOHN R. MALEY, Lecturer on Physiography, Poplar, E., writes:—'Shall certainly recommend it this season.'

JAS. WALLIS, Esq., St. Thomas Charterhouse Pupil Teacher Centre, Goswell Road, E.C., writes:—'Its great feature is the splendid way in which the Physical and Astronomical Geography is treated.'

JAS. WAUGH, Esq., B.A., Higher Grade School, Howard Gardens, Cardiff, writes:—'I am so pleased with it that I intend to introduce it into my school. It is just such a book as I have wished for a long time—one simple enough to be used almost as a Geographical Reader, and at the same time just condensed enough to make suitable answers to the science questions. I am particularly pleased with the Astronomical part. Your manner of dealing with this difficult section of the Syllabus, and the accompanying illustrations, are capital.'

T. BASTOW, Esq., B.A., B.Sc., Head Master of the Shipley Technical Schools:—'I am exceedingly pleased with Gregory's Physiography, and shall certainly bring it into use in my classes.'

GEO. TURNER, Esq., Science Lecturer, St. Paul's School, Middlesbro', writes:—'I beg to thank you very warmly for the excellent work on Physiography you sent me. I think very highly of it, and shall use it in our Physiography class this year.'

THOMAS SCALLAN, Esq., Temple Street Science School, Sligo, writes:—'Superior to any other text-book I have seen on the subject.'

Now Ready. Third Edition. Price 4s. Illustrated. Post Free, 3s.

ADVANCED PHYSIOGRAPHY.

By R. A. GREGORY, F.R.A.S., *and* J. C. CHRISTIE, F.G.S.,

Oxford University Extension Lecturer. *Lecturer in Geology at the Glasgow and West of Scotland Technical College.*

THE NEWCASTLE DAILY CHRONICLE says:—'We are glad to welcome a text-book of "Advanced Physiography" by Mr. Richard Gregory, which is supplementary to the elementary work of the author. This volume, like the other, covers its ground better than any other on the subject. There is nothing either of the scrappy or superfluous about it. The sections are well-jointed, and the style is very simple and direct. Mr. Christie adds three excellent chapters upon the condition of the earth's interior. The diagrams and illustrations are numerous and good, and the book is well indexed, and the work of an able teacher all over.'

NATURE, August 10th, 1893, says:—'We confidently recommend the book to the notice of teachers, for it is certainly one of the most excellent expositions of the subject we have yet seen.'

Mr. T. W. PIPER, St. Katherine's Training College, Tottenham, says:—'We shall at once adopt it at the College.'

Now Ready. Extra Cloth. Price 4s. 6d. nett.

HONOURS PHYSIOGRAPHY.

By R. A. GREGORY, F.R.A.S.,

AND H. G. WELLS, B.Sc., LOND.,

Lecturer in Geology at the University Tutorial College; Third in Honours in Geology and Physical Geography at B.Sc.; Fellow of the Zoological Society; Fellow (in Honours) and Dorek Scholar of the College of Preceptors.

One of H.M.I. says:—'I find several questions for the Scholarship Examinations, 1891, taken verbatim from Gregory's book.'

ADOPTED IN TRAINING COLLEGES AND P.T. CENTRE SCHOOLS.

FIFTH EDITION. Crown 8vo. Extra Cloth. Price 3s. 6d.

PHYSICAL AND ASTRONOMICAL GEOGRAPHY.

Specially designed for Pupil Teachers and Scholarship and Certificate Candidates. **WITH ORIGINAL ILLUSTRATIONS.**

OPINIONS.

ONE OF THE BEST-KNOWN EDUCATIONALISTS OF THE DAY writes:—'Mr. Gregory's Manual is simply magnificent.'

CHARLES W. REECE, Esq., Lecturer on Geography, Pupil Teachers' School, Thomas Street, London, E., writes:—'I have no hesitation in saying that the book is a splendid one. Mr. Gregory should be proud of it. I shall certainly recommend it. It ought to be not only in the hands of those for whom it is especially written, but also of every teacher of geography. The illustrations, type, and style of publication will be appreciated by all.'

THE UNIVERSITY CORRESPONDENT says:—'This Manual begins with some luminous explanations of various lineal, angular, and superficial measurements used in Physiography, and ends with a short classification of the races of mankind. The treatment is throughout full and lucid; the matter good and well chosen; the numerous original drawings are highly instructive [*e.g.*, those illustrating the causes of air-currents on pp. 154, 156]; the printing is clear; the binding, and execution of the cuts, leave nothing to be desired; and at the end of most of the eighteen chapters into which the book is divided, there is a useful summary of the contents of the chapter.

THE ROYAL COLLEGE OF SCIENCE MAGAZINE says:—'Astronomical and Physical phenomena are dealt with in such a comprehensive, simple, and accurate manner, as must at once recommend it to pupil teachers and scholarship students, for whom it is primarily intended. Teachers of Elementary, and even advanced Physiography, would do well to adopt it as a text-book; while our own students would find the Astronomical portions particularly helpful at the end of their first year. The style is lucid, and easy for Elementary students to understand; the numerous illustrations and diagrams are excellent. A recapitulation at the end of each chapter will be found very useful for examination work.'

NATURE says:—'The general conception and arrangements of this volume are very good, and the same may be said of the detailed treatment of most of the subjects discussed. The chapter on the rotation of the Earth and consequent phenomena is exceedingly good, as is the following one on its revolution. The account of eclipses and of the tides is exceedingly good, and well calculated to render these phenomena intelligible to learners. The chapters on the atmosphere and its movements are also clear and instructive, as are those on oceans and ocean currents. The numerous illustrations are clear, and elucidate some of the more difficult problems discussed.'

London: JOSEPH HUGHES & CO., Froebel House, St. Andrew's Hill, Doctors' Commons, E.C.

We used

GREGORY'S

PHYSIOGRAPHY

Last year and

Have done

REMARKABLY WELL.

Had about

78 Students sat

and

NOT

A

FAILURE.

W. WILSON, Esq.,

SPRING GROVE SENIOR BOARD SCHOOL, HUDDERSFIELD.

CAMBRIDGE UNIVERSITY PRESS.

Subjects for the Cambridge Local Examinations, 1895.

THE PITT PRESS SHAKESPEARE FOR SCHOOLS.

Shakespeare, Twelfth-Night. Edited, with Introduction, Notes, and Glossary, by A. W. VERITY, M.A., sometime Scholar of Trinity College, Cambridge. 1s. 6d.

THE CAMBRIDGE MILTON FOR SCHOOLS.

Milton, Paradise Lost. Books III. and IV. Edited, with Introduction, Notes, and Indexes, by A. W. VERITY, M.A. 2s.

PITT PRESS SERIES.

The Elements of English Grammar. By ALFRED S. WEST, M.A., Trinity College, Cambridge. 2s. 6d.

Scott, Marmion. Edited, with Introduction, Notes, and Glossary, by J. HOWARD B. MASTERMAN, B.A., Lecturer of St. John's College, Cambridge. 2s. 6d.

Souvestre, Le Serf, Le Chevrier de Lorraine. Edited by ARTHUR R. ROPES, M.A., late Fellow of King's College, Cambridge. 2s.

Souvestre, Le Serf. Edited, with Notes and Vocabulary, by A. R. ROPES, M.A. 1s. 6d.

Molière, Le Misanthrope. Edited by E. G. W. BRAUNHOLTZ, M.A., Lecturer in French in the University of Cambridge. 2s. 6d.

Riehl, Die Ganerben, Die Gerechtigkeit Gottes, Zwei Geschichten. Edited, with Vocabulary and Notes, by H. J. WOLSTENHOLME, B.A. (Lond.). 3s.

Hackländer, Der geheime Agent. Edited, with Introduction, English Notes, and an Index, by E. L. MILNER-BARRY, M.A., Gonville and Caius College, Cambridge. 3s.

Cornelius Nepos, Lives of Miltiades, Themistocles, Aristides, Pausanias, and Cimon. Edited, with Notes and Vocabulary, by E. S. SHUCKBURGH, M.A., late Fellow of Emmanuel College, Cambridge. 1s. 6d.

Horace, Epistles, Book I. Edited by E. S. SHUCKBURGH, M.A. 2s. 6d.

Caesar, de Bello Gallico, Books IV. and V. Edited by A. G. PESKETT, M.A., Fellow of Magdalene College, Cambridge. 1s. 6d.

Vergil, Aeneid, Book X. Edited by A. SIDGWICK, M.A., Reader of Greek in the University of Oxford. 1s. 6d.

Livy, Book XXI. Edited by M. S. DIMSDALE, M.A., Fellow of King's College, Cambridge. 2s. 6d.

Cicero, pro Milone. Edited by J. S. REID, Litt.D., Fellow and Tutor of Gonville and Caius College, Cambridge. 2s. 6d.

Xenophon, Anabasis, Book V. Edited by A. PRETOR, M.A., Fellow of St. Catharine's College, Cambridge. 2s.

Euripides, Iphigenia in Aulis. With Introduction and Notes by C. E. S. HEADLAM, M.A., Fellow of Trinity Hall, Cambridge. 2s. 6d.

Herodotus, Book V. Edited by E. S. SHUCKBURGH, M.A., late Fellow of Emmanuel College, Cambridge. 3s.

Thucydides, Book VII. Edited by H. A. HOLDEN, LL.D. 5s.

Homer, Iliad, Book XXIII. Edited by G. M. EDWARDS, M.A., Fellow of Sidney Sussex College, Cambridge. 2s.

PITT PRESS MATHEMATICAL SERIES.

Arithmetic for Schools. By C. SMITH, M.A., Master of Sidney Sussex College, Cambridge. Second Edition. Complete, with or without Answers, 3s. 6d.

PART I. CHAPTERS I.–VIII. ELEMENTARY. With or without Answers, 2s.

PART II. CHAPTERS IX.–XX. With or without Answers, 2s

LONDON: C. J. CLAY & SONS,

CAMBRIDGE UNIVERSITY PRESS WAREHOUSE, AVE MARIA LANE.

LONDON UNIVERSITY EXAMS.

AT MATRICULATION, JUNE 1894,

167 University Correspondence College Students were successful.

AT INTER. ARTS, 1894,

112 University Correspondence College Students were successful, with 12 places in Honours.

AT INTER. SCIENCE AND PRELIM. SCI., JULY 1894,

149 University Correspondence College Students were successful, with 23 places in Honours, including 3 First Places in First-Class Honours.

AT B.A., 1894,

122 University Correspondence College Students were successful.

AT B.Sc., 1894,

35 University Correspondence College Students were successful.

CLASSES FOR 1895 & 1896 EXAMINATIONS COMMENCE AS FOLLOWS:—

CLASSES FOR MATRICULATION, JUNE 1895 and JANUARY 1896, commence January 26th. Fees, Preparation in all Subjects from £3 3s.

CLASSES FOR INTER. ARTS, 1895, and Two Years' Courses for 1896, commence January 5th. Fees, Preparation in all Subjects from £5 5s.

CLASSES FOR INTER. SCI. and PRELIM. SCI., 1895, commence January 5th. Fees, Preparation in all Subjects, from £6 16s.

All Fees are strictly inclusive, and payable as arranged on joining.

Prospectus and full particulars of Classes, **Guide to Matriculation, or any Arts or Science Examination** post free on application to

THE SECRETARY, Univ. Corr. Coll. London Office,
32, Red Lion Square, London, W.C.

The University Tutorial Series.

SPECIAL SUBJECTS FOR MATRICULATION, 1895 & 1896.

FOR JUNE 1895.

Cæsar.—Gallic War, Book VII. Edited by A. H. ALLCROFT, M.A. Oxon., and W. F. MASOM, M.A. Lond. With Maps.

PART I.—INTRODUCTION, TEXT, and NOTES. **2s. 6d.**

PART II.—A VOCABULARY (in order of the Text), with TEST PAPERS. *Interleaved.* **1s. 6d.**

PART III.—A LITERAL TRANSLATION. **1s. 6d.**

THE THREE PARTS IN ONE VOL. **4s. 6d.**

'The introduction deals concisely but sufficiently with general matters necessary to be known by the student, and the notes are full and to the point.'—*Schoolmaster.*

'A thoroughly complete and efficient work.'—*Board Teacher.*

Xenophon.—Hellenica, Book IV. Edited by A. WAUGH YOUNG, M.A. Lond., Gold Medallist in Classics.

INTRODUCTION, TEXT, and NOTES. **3s. 6d.**

'A favourable specimen of considerate and scholarly recension and annotation.'—*Educational News.*

'An edition in every way worthy of praise.'—*Teachers' Aid.*

—— **Books III., IV.** A LITERAL TRANSLATION. **2s. 6d.**

FOR JANUARY 1896.

Ovid.—Heroides I., II., III., V., VII., XII. Edited by A. H. ALLCROFT, M.A. Oxon., and B. J. HAYES, M.A. Lond. and Camb., Gold Medallist in Classics.

PART I.—INTRODUCTION, TEXT, and NOTES. **2s. 6d.**

PART II.—A VOCABULARY (in order of the Text), with TEST PAPERS. *Interleaved.* **1s. 6d.**

PART III.—A CLOSE TRANSLATION. **1s. 6d.**

THE THREE PARTS IN ONE VOL. **4s. 6d.** *[In the press.*

Xenophon.—Anabasis VII. A CLOSE TRANSLATION. By W. H. BALGARNIE, M.A. Lond. **1s. 6d.** *[In the press.*

COMPLETE CATALOGUE of over 300 *Books, specially adapted for London University Exams., including Special Subjects for 1895 and 1896.* **FREE ON APPLICATION.**

London: W. B. CLIVE, University Correspondence College Press Warehouse, 13, Booksellers Row, Strand, W.C.

COUPON
PRACTICAL TEACHER
JANUARY 1895.

PRINTED BY EYRE & SPOTTISWOODE, *Her Majesty's Printers*, DOWNS PARK ROAD, N.E., and PUBLISHED BY THE PROPRIETORS, JOSEPH HUGHES & CO., AT FROEBEL HOUSE, ST. ANDREW'S HILL, DOCTORS' COMMONS, LONDON, E.C.